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THESIS

AN EXPERT SYSTEM
FOR PROCESSING UNCORRELATED
SATELLITE TRACKS

by

LCDR Michael A. Hecker

December, 1992

Thesis Advisors: Dr. Y. Kanayama
Dr. I. M. Ross

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Through an array of ground based radar sights and optical cameras, the United States military tracks objects in near and far Earth orbit. The sensors provide epoch and ephemeris information that is used to update a database of known objects. While a majority of the sensor observations are matched to their corresponding satellites, a small percentage are beyond the capabilities of current software and can not be correlated. These uncorrelated targets, UCT's, must be manually fitted by orbital analysts in a labor intensive process. As an alternative to this human intervention, the use of artificial intelligence techniques to augment the present computer code was explored. Specifically, an expert system for processing UCT's at the Naval Space Surveillance Command was developed. Rules were generated through traditional knowledge engineering methods and by a novel application of machine learning. The initial results are very good with the operational portions of the system matching the performance of the experts with an accuracy of 99%. Although not yet complete, the code developed in this research definitely shows the potential of using artificial intelligence to process UCT's.

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An Expert System
for Processing Uncorrelated
Satellite Tracks

by

Michael A. Hecker
Lieutenant Commander, United States Navy
B.S., United States Naval Academy

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of the requirements for the degree of

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MASTER OF SCIENCE IN AEROSPACE ENGINEERING

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Author: ______________________________
Michael A. Hecker

Approved by: ______________________________
Dr. Y. Kanayama, Thesis Advisor

____
Dr. I. M. Ross, Thesis Advisor

____
Dr. R. McGhee, Chairman
Department of Computer Science

____
Dr. D. Collins, Chairman
Department of Aeronautics and Astronautics

ABSTRACT

Through an array of ground based radar sights and optical cameras, the United States military tracks objects in near and far Earth orbit. The sensors provide epoch and ephemeris information that is used to update a database of known objects. While a majority of the sensor observations are matched to their corresponding satellites, a small percentage are beyond the capabilities of current software and can not be correlated. These uncorrelated targets, UCT's, must be manually fitted by orbital analysts in a labor intensive process. As an alternative to this human intervention, the use of artificial intelligence techniques to augment the present computer code was explored. Specifically, an expert system for processing UCT's at the Naval Space Surveillance Command was developed. Rules were generated through traditional knowledge engineering methods and by a novel application of machine learning. The initial results are very good with the operational portions of the system matching the performance of the experts with an accuracy of 99%. Although not yet complete, the code developed in this research definitely shows the potential of using artificial intelligence to process UCT's.

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I. INTRODUCTION

Currently, over 7000 objects circling the Earth are tracked by both the Air Force and the Navy. The orbital information on each object is maintained in a database that is used by the military and civilian communities for various purposes; cataloguing space debris, warning of close encounters between commercial satellites, and deconflicting the launch of the space shuttle are a few examples. Utilizing an array of sensors, monitoring is performed on a continuous basis. The sensors, which include both ground based radar sights and optical cameras, produce epoch and ephemeris information that is used to update the orbital catalog of known satellites. Of the 1.4 million observations produced each month, 98.5% can be automatically matched to objects in the orbital catalog by current software. The remainder, called Uncorrelated Targets (UCT), must be manually fitted to the database in a labor intensive procedure that requires human intervention for approximately 21,000 observations per month. The effort consumes one to two thousand manhours a year and, from the launching of new satellites and the break up of those already in orbit, the work load is growing with the increasing population of objects in Earth orbit. (Naval Space Surveillance Command, 1990, p. 7)

Several methods are being explored to reduce the work load imposed by UCTs. One obvious solution is to employ a computational model that more accurately accounts for orbital perturbations and does an improved job of predicting an object's motion. An alternate possibility is to use heuristic or non-numerical methods in software that simulate

the solution techniques already being used by human analysts for manual updates. Utilizing tools developed in the field of artificial intelligence, the human operator could be potentially replaced by an expert system.

The purpose of this thesis is to explore the feasibility of using such an expert system to process UCT's. Specifically, the idea of implementing a knowledge-based system at the Naval Space Surveillance Center (NAVSPASUR) will be examined. The architecture of the system will be presented along with an initial code that could form the basis for an implementation. Finally, the feasibility and limitations of the expert system approach will be discussed.

II. BACKGROUND

A. ORBITAL MODEL

NAVSPASUR uses the Brouwer-Lyddane theory of orbital motion. This model has a substantial advantage over Kepler's in that it accounts for a non-spherical Earth and the associated anisotropic gravitational field. In addition, a NAVSPASUR modification eliminates a singularity and allows for a simplistic representation of the atmospheric drag. Accuracies of several hundred meters are typical when predicting satellite positions with this algorithm. (Naval Research Laboratory, 1991)

The original Brouwer theory is based on a propagation algorithm that can be used to predict the future position of a satellite. The gravitational potential of Earth is expressed as a set of spherical harmonics and solved using a series solution:

$$U=\frac{\mu}{r}-\frac{\mu}{r}\sum_{n=1}^{\infty}\frac{R_E{}^n}{r^n}J_n\,P_n\,\sin\beta$$

where
μ = *Earth's gravitational constant*
r = *Distance of the satellite from the Earth's center*
R_E = *Radius of Earth*
J_n = *Coefficient dependent on Earth's mass distribution*
P_n = *Legendre polynomials*
β = *Geodetic latitude*

This contrasts with Kepler's simpler representation which assumes all the J_n-factors are zero and truncates the series after one term. Brouwer's model results in both the satellite's position and the actual orbital elements varying with time. The equations of

motion for this dynamic system have been solved using Hamilton-Jacobi theory. (Brouwer, 1959)

The Lyddane modification to Brouwer's model accounts for singularities that occur in circular orbits (Lyddane, 1963). The NAVSPASUR modification accounts for singularities that occur as inclination approaches 63.4°. It also includes a term for atmospheric drag based on a spherical atmosphere with density varying exponentially with height

$$\rho(r) = \rho_0 e^{-\frac{r-r_0}{H}}$$

where
r = *altitude above the surface of Earth*
r_0 = *Reference altitude*
ρ_0 = *Density at reference altitude*
H = *Scale height*

The actual code for the orbital prediction routine is written in the fortran program PPT2.

B. SENSOR DATA

Various sensors are maintained by the Navy, Air Force, and NASA for sighting satellites. Based on radar or optical cameras, they provide the position of the satellite relative to the observer. Using transformation matrices, these observations are converted into parameters in the geocentric inertial coordinate system such as right ascension and declination. The sensors are "intelligent" in that they provide not only a right ascension, declination, height, and time of observation (epoch), but also a best guess as to what satellite was observed. These are called ***known observations***. If the sensor can not come up with a best guess, then an ***unknown observation*** is generated. Groups of observations

of the same satellite from the same sensor form a *track*. (Naval Space Surveillance Command, 1990, pp. 1-2)

C. DATAFLOW AT NAVSPASUR

1. Orbital Catalog

The primary database of objects circling the Earth is the orbital catalog. In addition to the orbital elements, it holds a list of the last 75 sensor observations attributed to each item in the catalog. A sample set of orbital elements is shown in Table I.

2. Real Time Operations

NAVSPASUR is the Navy command tasked with tracking, cataloging, and predicting satellite orbits. To support this effort, a suite of computers and fortran

TABLE I. ELEMENT SET

PARAMETER	UNITS	VALUE
INTERNATIONAL DESIGNATION	N/A	88 098 C
CATALOG NUMBER	N/A	20132
DECLINATION	DEGREES	4.07
PERIOD	MINUTES	440.34
RIGHT ASCENSION	DEGREES	333.63
DECAY RATE	MIN/DAY	-0.1590
ECCENTRICITY	N/A	0.00
EPOCH OF THE ELEMENT SET	YYMMDD	911222

software is used. A simplified version of the data processing that takes place is shown in Figure 1. Incoming observations from sensors are stored in a holding file. Every 15 minutes, the known observations are processed by a computer program called SATO. Using the PPT2 algorithm and a least squares fit on each observation, SATO validates the sensor's best guess and, if it is within parameters, uses the observation to update the current orbital element set in the database. Unknown observations are not processed on a real time basis. (Naval Space Surveillance Command, 1990, pp. 3-9)

. **Off Line Operations**

Unknown observations and observations rejected by SATO are written to a second holding file. Daily, the program VERIFY examines this file and performs an exhaustive attempt to fit the unknown/rejected observations to the database. Tolerances in VERIFY are no different than those for SATO, consequently tracks that were not accepted by the real time computations will be subsequently rejected by the off line program. However, VERIFY will attempt to fit rejected observations to other satellites and will process unknown observations.

Tracks which still do not fit are run through a third program called SID (Satellite Identification program) which simply fits every observation to every possible satellite that can accommodate the observations and prints out a report of the results. Tolerances for SID are lenient so the printout it produces usually contains a few thousand entries. An example portion of that printout follows:

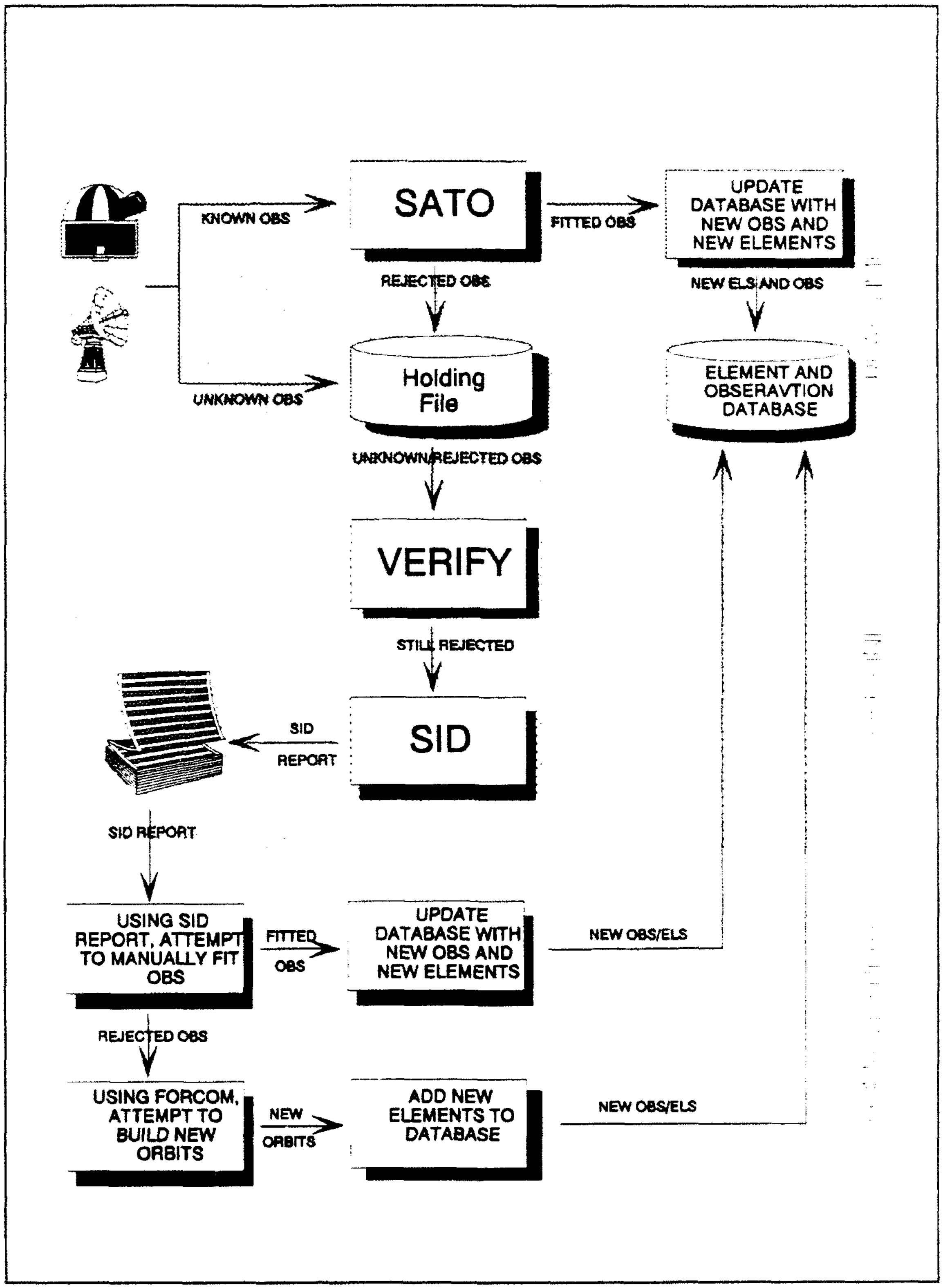


Figure 1. NAVSPASUR Data Flow

```
20132  4.07         440.34   -.1590    88 098 C    333.63    911222
       911222   000549.46    1129     -6     -1     -8    90335    382
       911222   000559.50    1148     -6     -0     -8    90335    382
       911222   000609.65    1168     -6     -1     -7    90335    382
       911222   000629.74    1207     -5     -2     -6    90335    382
       921223   232910.67    1329     10     10     29    20132    334
       921223   233020.64    1301     21     15    312    20132    334

20150  82.94        104.74   -.0000    89 059 B    155.98    911223
       912221   101547.90     507    160   1063     -9    90452    385
```

The first line lists the satellite that the program is currently matching to the observations. From left to right, the data fields are the NAVSPASUR catalog number, the inclination, the period, the decay rate, the international designation for the satellite, the right ascension angle, and the epoch of the element set. Units for each field were previously given in Table I. Following the satellite data is one or more lines of observation data with units and sample values shown in Table II. The epoch, both date and time, is provided along with the measured altitude of the observed object. The next

TABLE II. OBSERVATION DATA FROM SID

PARAMETER	UNITS	VALUE
EPOCH OF OBSERVATION	YYMMDD HHMMSS.HH	911222 000549.26
ALTITUDE	NM	1129
ΔU	N/A	-6
ΔV	N/A	-1
ΔW	N/A	-8
SENSOR TAG	N/A	90335
SENSOR	N/A	382

three columns are the cartesian errors that resulted in attempting to fit this particular observation to the satellite's current orbit. The NAVSPASUR programs utilize a least mean square algorithm for curve fitting and the resulting errors are presented in the orbital reference frame as shown in Figure 2. Consequently, the columns give the ΔU, ΔV, and ΔW for the particular observation. The numbers listed are not actual distances, rather they are based on the partial derivatives of the observation with respect to the satellite's element set. As such they have no units.

The final two columns in the rows of observation data are the sensor tag, i.e., the sensor's original best guess, and the sensor's identification number.

4. Manual Operations

With the production of the SID report, computer processing of UCTs ends and human intervention is necessary. Daily, an orbital analyst examines the SID report

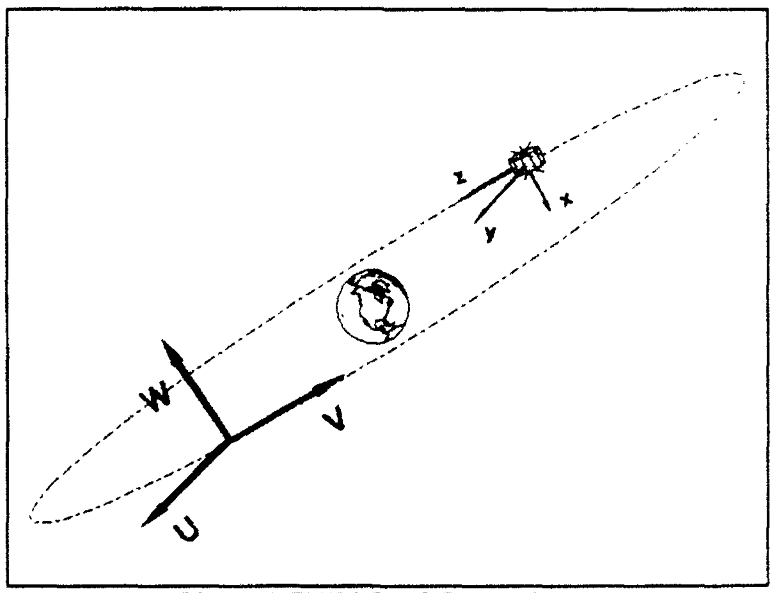


Figure 2. U, V, W REFERENCE FRAME

line by line, looking for tracks that can be added back into the database. Evaluation centers on the ΔU, ΔV, ΔW values and corroborating data fields that might explain the magnitude of the errors. If a potentially good track is found, an attempt is made to fit it into the desired orbit using an iterative technique. The new observations are combined with selected old observations to build a new set of orbital elements that can more accurately portray the satellite's motion. Again, a least squares fit is used, with various observations being added and subtracted until a suitable orbit is achieved. Observations that ultimately fail to fit are returned to the list of unknown/rejected observations.

Once the first analyst is done, a second analyst looks at the remaining unknown/rejected observations and attempts to build entirely new orbits. The resulting orbits account for objects that recently appeared in space due to launches or break ups. If any promising orbits are developed, the salient observations are removed from the unknown/rejected list and added to the database as a new but unknown satellite. When the second analyst is complete, the remaining observations are written back to the holding file for consideration the next day.

As noted above, 98.5% of all observations are automatically fitted to the database. The remaining observations, approximately 21,000 per month, are left to the human analysts. The most common causes of failure to fit are (Naval Space Surveillance Command, 1990, p. 3):

- **Satellites that are infrequently observed.** Due to orbital orientation or high eccentricity, some objects are not viewed often enough to maintain a current set of orbital elements. As the epoch of the element set grows older, the accuracy of predicting the object's motion decreases.

- **Satellites that are in high decay orbit.** The present model can not account for objects approaching reentry or objects with rapidly increasing drag.

- **Satellites that are maneuvered.** Changing the orbit of an active payload produces a new set of elements. If the maneuver is small enough, the change will be detected as an error which can be accommodated. If too large, the maneuver may render the old element set useless.

- **Solar activity.** Solar flares increase upper atmospheric drag, resulting in accelerated orbital decay. Again, the present model can not take this into account.

III. PURPOSE OF THESIS

The goal of this research is to determine the feasibility of using an expert system to correlate UCT's to the NAVSPASUR orbital catalog. As envisioned in Figure 3, such a system would ultimately replace the human expert with a computer program with equal capabilities. Although an implementation is beyond the scope of this work, as much code as possible was written to validate ideas and algorithms. Where code has not been provided, conceptual solutions are outlined.

Addressing the correlation of UCTs with an expert system is appealing for several reasons. First, heuristic methods are computationally tractable while current analytical solutions are not. *Special theory* models, which predict satellite motion through integration instead of propagation, are available with accuracies in tens of meters instead of hundreds. These algorithms contain more detailed models of upper atmospheric density, the main source of error in the NAVSPASUR implementation. Unfortunately, the additional accuracy comes at the cost of several orders of magnitude in computing resources (Naval Research Laboratory, 1991, p. 1). By contrast, the complexity of an expert system is governed by it's rule set and, depending on intracity of that knowledge, could prove quicker to run. A knowledge-based system has the further advantage of being used only when needed on actual UCTs, while a more accurate orbital model would be needlessly applied to all observations, including the 98.5% that already conform to the Brouwer-Lydanne model.

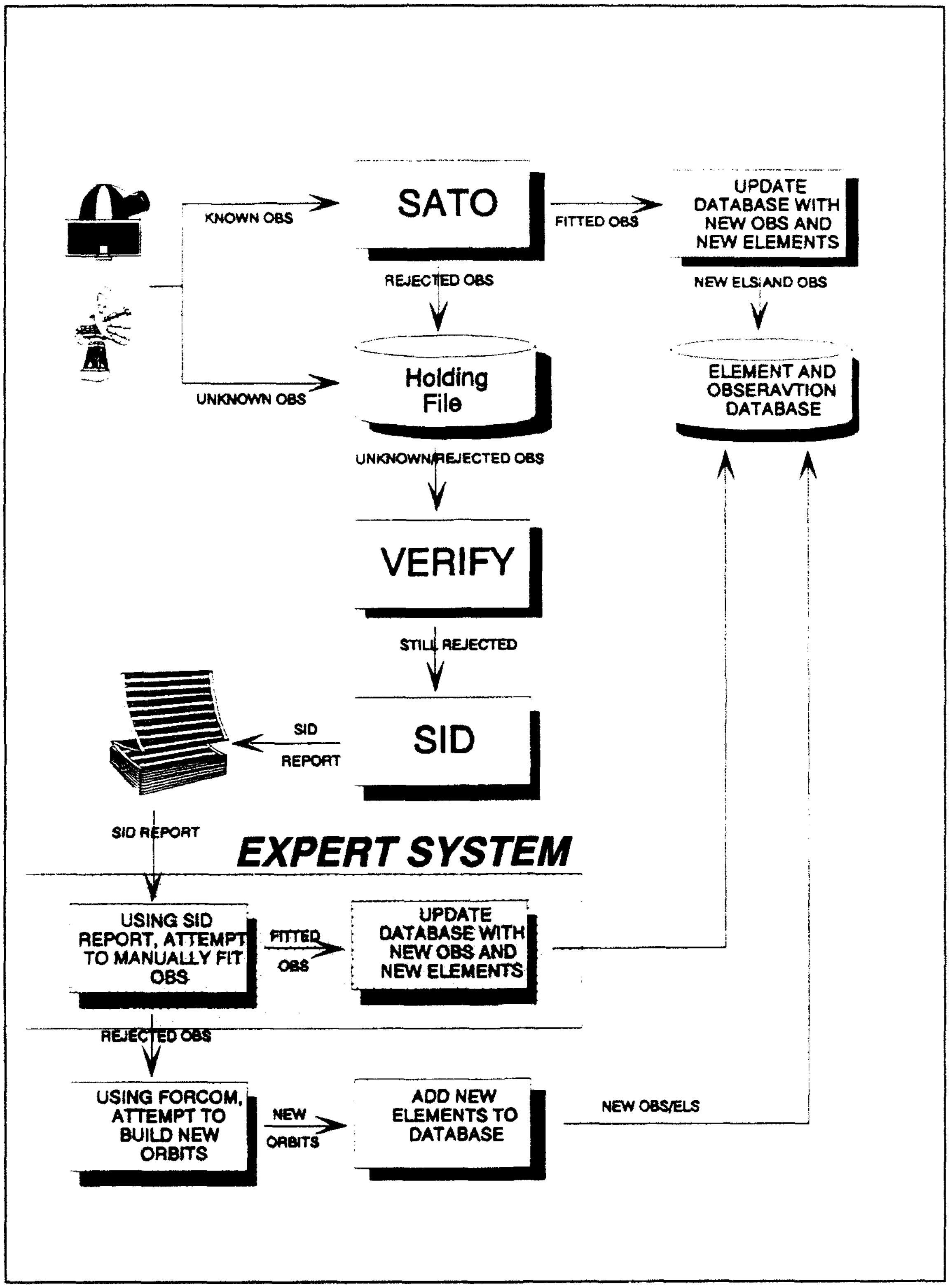


Figure 3. Role of Expert System

Perhaps the most important advantage of the heuristic approach is that it might work. Because the orbital analysts are quite adept at fitting UCTs, any expert system that successfully captures and applies their knowledge has at least the potential for equal success. The importance of heuristics to the analysts' solution method is apparent. As previously discussed, the process of fitting UCTs is iterative involving m orbits and n points to fit. Using a worst case scenario of random search, the time complexity is $O(mn)$ to fit all observations. For 7000 orbits and 1500 observation per day to fit, this produces a search space of 10^7 nodes, far too many to work through using simple trial and error. Definitely, the analysts must use some kind of rules of thumb to prune the search tree and guide their efforts.

On an implementation level, the analysts' job appears to be a good candidate for automation via an expert system. The problem is well understood; it defies easy solution by traditional, declarative programming languages; it usually has a correct solution; it can be solved by some people more quickly than by others, indicating that some sort of expertise is involved; the analyst are good at articulating the solution methods they use. Essentially, the problem is one of correlation and mating the correct data to the correct orbit.

IV. METHODOLOGY

A. SELECTION OF COMPUTER LANGUAGES

Two languages were selected for use in this project, C and CLIPS. For routines that do not benefit from an expert system approach, it is sensible to use a more efficient procedural language such as Ada, C, Fortran, or Pascal. Although the majority of code used by NAVSPASUR is currently in fortran, new code is being developed in C to accommodate the transition to an Unix based distributed processing system. To assure compatibility with this new system, an ANSI C compiler was selected. Although C++ constructs were available, they were not utilized.

For the actual expert system, the C Language Integrated Production System (CLIPS) was chosen. First released in 1985 by NASA's Johnson Space Center, it provides both a language and an environment for developing expert systems. Utilizing IF...THEN... rule constructs, it uses a forward chaining, data driven inference engine based on the Rete algorithm. The syntax of the language is similar to Lisp. CLIPS has enjoyed considerable success in the military and government sectors for several reasons: portability, a rich set of development resources, and most importantly low cost (the software is free to government agencies). One interesting feature of CLIPS is that it is written in C itself and can autogenerate executable C code for any expert system written in the CLIPS syntax. Consequently, all the code presented in this thesis can be converted and compiled into ANSI C. (National Aeronautics and Space Administration, 1991)

B. KNOWLEDGE ENGINEERING

Knowledge engineering is the process of eliciting rules from the human expert for use by the expert system. Traditionally, the engineering process develops a rule set through a time consuming, iterative approach involving successive interviews between the system developer and the human expert. For practical reasons, that approach was not possible here. Only one week was available for interviewing and, because of the coast to coast distances involved, multiple trips to NAVSPASUR were not feasible. This limited access to the resident experts may be viewed as a hinderance, but actually prompted an innovative approach to eliciting knowledge through the use of machine learning.

C. INTERNAL REPRESENTATION OF FACTS

On a conceptual level, the experts and the expert system deal with tracks. Tracks are composed of one or more observations and observations are composed of several fields of data. During analysis, the experts are not so much interested in the individual observations themselves as the aggregate features of the tracks as a whole. This implies that facts about a track should be based on statistical values derived from the observations that make up that track. Statistics can provide a variety of parameters for analysis; pertinent ones were selected based on the information gleaned during the knowledge engineering process and refined during the development of the expert system.

D. PREPROCESSING ROUTINES

The building and parameterizing of tracks is performed by preprocessing routines written in C. While this function could have been carried out in the expert system itself.

the pattern matching and heuristic capabilities of CLIPS were deemed unnecessary and inefficient for what is essentially a numerical problem.

The original data used in for this research came from the SID report for 12 February 1992. It consists of approximately 100 pages of computer printout which contain over 3000 individual observations and an unknown number of tracks. This text was converted into electronic format through the use of a flatbed scanner with associated OCR software. The resulting ASCII file contained a large number of formatting and character errors, consequently a simple parser was written to tokenize the file, check for errors, and report any discrepancies. Once the data was cleaned up, observations were grouped into appropriate tracks and statistics about each track were then computed. The results were then stored in a separate output file using a format compatible with CLIPS.

The source code for the preprocessing routines is located in appendix E. The listing FILTER.C is for the parser and TRACKER.C for the track building algorithm. While the track building algorithm is pertinent to any real world implementation, the parser is not and was developed solely for this research.

E. EXPERT SYSTEM ARCHITECTURE

Based on the insight gained during the knowledge engineering phase, it became evident that the processing of UCTs breaks down into two functional parts. First, the output from the SID program, the list of uncorrelated observations, must be reviewed for "good" data. Second, an attempt is made to fit these good observations to the satellite database. The first step is necessary for efficiency: although an effort could be made to

fit each and every track from the SID output, such an endeavor would be time consuming and impractical.

The second step can tolerate errors from the screening process, since bad data passed by the first step will ultimately fail to fit to the database. However, a penalty is paid in performance since time will be lost while attempting to fit bad observations. A more important concern is errors made during the first step that inadvertently screen out good observations. Such data never reaches the stage of database fitting and is consequently lost. In observing the experts, more time was generally spent trying to fit tracks to the database, however more knowledge was required for the screening of data. Therefore, the emphasis in this thesis is on designing an efficient screening routine.

The overall layout of the expert system is outlined in Figure 4. It consists of two modules, the evaluator and the synthesizer. The evaluator performs the function of screening the input data. It determines the goodness of each track and passes its results on to the synthesizer. The synthesizer performs the task of actually fitting the good data

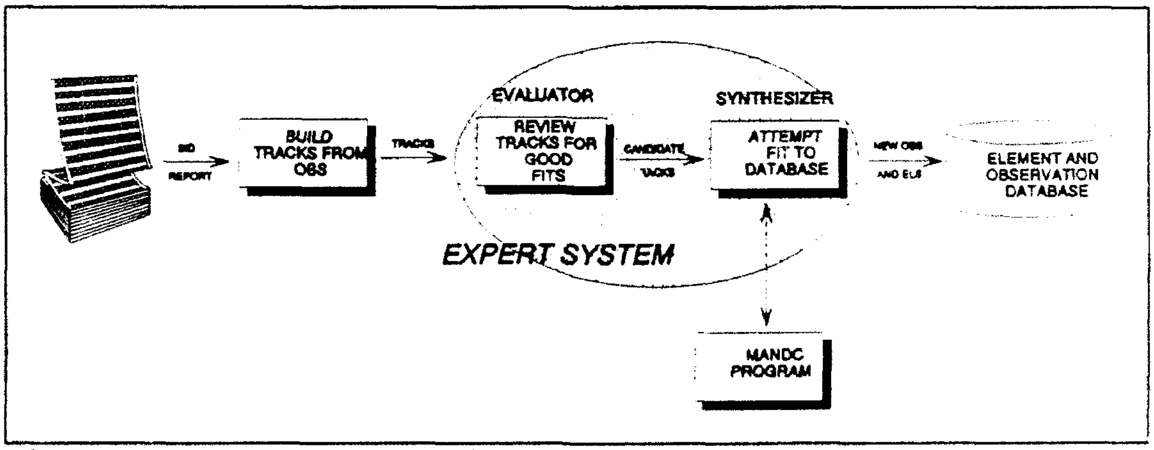


Figure 4. Conceptual Design

to the database. A separate support routine, MANDC, is called during the iterative attempts to fit the data.

1. The Evaluator

a. A Hybrid System

As previously described, the evaluator determines the "goodness" of a track. It utilizes an evaluation function in combination with a traditional rule based expert system. Conceptually, the evaluation function takes the tracks built by the preprocessing routines and performs an initial scoring of each tracks goodness. These scores are then refined by the production system to produce a final ranking from best candidate to worst candidate.

b. Evaluation Function

(1) The Evaluation Process. Evaluation is the process of deciding between a set of options, known as candidates. The purpose is to determine the worthiness of candidates relative to each other with the goal of selecting the best one. As defined by Mitri (1991)

> Evaluation is often described in terms of establishing numeric scores or qualitative ratings for a candidate. Candidates are usually represented in terms of attributes (criteria) that are relevant to the evaluation.

In the case of processing UCTs, the candidates are the individual tracks and the criteria are features of those tracks such as drag, errors along the three axis, and the number of observations in the track. Some of these attributes come from the observations that make up the track while others are based on the association of the track with a particular satellite.

An evaluation function is the algorithm that determines the goodness of a candidate. Often, it is based on a weighted summation where the individual criteria are multiplied by a scaling factor and the results added to produce a composite score. The scaling factors, or weights, relay the relative importance of each criteria.

Evaluation is a process closely akin to categorizing or classifying. However, programs that categorize attempt to assign a candidate to one of several groups while programs that evaluate attempt to determine how well a candidate fits into one particular group. Further, categorizing can be discrete while evaluation is always continuous. Evaluation functions hold two advantages over symbolic computing: they are competent at handling continuous data and they can be generated through machine learning.

(2) Continuous Versus Discrete Data. For the UCT problem, the majority of the facts being examined are continuous, ranging over a set of values. By contrast, symbolic computing expects facts to take on discrete values and must make allowances for continuous variables. This is usually accomplished by dividing the continuous range into subranges and assigning symbolic names to each subrange. As an example, one of the criteria used in evaluating a track is satellite drag which can vary by four orders of magnitude from 10^0 to 10^4. The experts employ rough boundaries that divide drag into the three ranges of average, high, and very high (Jenkins, 1992). For the most part this scheme works well and production rules that use these adjectives in the code are easily understood by the layman. However, problems arise when a value falls near the edge between two ranges. While a drag of .0099 is regarded as average, a drag of .0100 is considered high even though the difference between the two is insignificant.

Berliner and Ackley first addressed this situation, referring to it as a boundary problem which occurs with any mapping of continuous values into a discrete domain. It leads to "fragility" in the expert system, since small differences in the facts can lead to very divergent conclusions. (Berliner and Ackley, 1982)

The solution to the boundary problem lies in reducing the granularity of the data by dividing the ranges into smaller, and consequently more numerous, subranges. Unfortunately, this usually requires an iterative solution with different boundary values being selected, tested, and refined until an acceptable answer is achieved. In addition, more subranges lead to more production rules and greater computational complexity. A more satisfying method would utilize the continuous data directly. An evaluation function is one such method.

(3) Machine Learning. For this particular problem, a second advantage of evaluation functions was found in that they can take advantage of machine learning. Traditional expert system development requires a great deal of knowledge engineering to acquire a viable rule base. This in return demands a substantial investment of time on the part of the expert, who must provide guidance and feedback during the formation of rules. Machine learning techniques use a different tactic. Rather than gleaning knowledge from the expert, they take it from the data. Although the experts participation during system development can not be dismissed, it is certainly reduced and makes their availability less of a factor.

Generation through machine learning is not a property of all evaluation functions, but rather is limited to a subclass of problems. For this research, the function was developed through an application of neural network theory. The neural

network was trained on a set of examples provided by the expert and the results used to construct the function. The criteria used as input data, the output results, and the form of the evaluation algorithm were all constrained by the type of neural network selected for use. The specifics are discussed in Chapter V.

c. Production System

(1) Domain Knowledge. An evaluation function's usefulness is limited by the input data it can process. Evaluations are based solely on the set criteria provided about a particular candidate; other domain knowledge is not available. Consequently, background information, expert opinion, and context sensitive data are not used by evaluation functions. This inability to use all available domain knowledge to full advantage is a serious liability and several methods have been developed to overcome it. In some of the classical artificial intelligence research in gaming theory, Samuel (1959) used a signature table in conjunction with an evaluation function for a program that played checkers while Berliner (1977) used structured matching in his backgammon algorithm. When trying to determine the next best move to make, both of these techniques supplemented the evaluation algorithm with situational knowledge such as the relative board positions of other pieces and the current phase of the game. The approach taken for UCTs uses a rule based system to compliment and complete the evaluation function. After the evaluation function applies its specific and limited knowledge about certain criteria to produce an initial ranking, the expert system uses other domain knowledge to refine and finalize the rankings.

(2) Development Of Rules. The two sources of rules were background knowledge and expert opinion. Background knowledge included theory in orbital mechanics and aerodynamics (knowledge of first principles) and written reports provided by NAVSPASUR regarding operational procedures (Naval Space Surveillance Command, 1990). The remaining rules were based on interviews with and observations of the orbital analysts. As an example, two rules are presented. The first involves the reliability of sensors while the latter examines the effects of tracks on each other.

One bit of background knowledge regards sensor reliability. Certain radar installations consistently provide accurate range and bearing information while others produce data of questionable quality. The human experts make use of this data to adjust the tolerances for acceptable errors; specifically, allowable ΔU, ΔV, ΔW errors from an unreliable sensor are less than the allowable errors for a more accurate sensor (Jenkins, 1992). The dependability of a sensor changes with time making it a dynamic variable and unusable by the evaluation function which is static. Therefore, knowledge about sensor reliability was encoded into the symbolic portion of the expert system and took the form of the following rule/facts combination

```
(deftemplate sensor
     (field id_number   (type           INTEGER))
     (field reliability (type           SYMBOL)
                    (allowed-symbols GOOD BAD))
); DEFTEMPLATE SENSOR

(deffacts sensors
     (sensor (id_number 334) (reliability GOOD))
     (sensor (id_number 369) (reliability GOOD))
     (sensor (id_number 396) (reliability GOOD))
     (sensor (id_number 404) (reliability GOOD))
     (sensor (id_number 329) (reliability BAD))
);sensors
```

```
(defrule bad_sensor
   (declare (salience 900))
   ;Reduce rankings for tracks from unreliable sensors. The amount
   ;of reduction is 10% here, but that number needs to be verified.
   ;Not enough data available to date to really test it
   (flags (bad_sensor T))
   (sensor (reliability ?RELIABLE&:(eq ?RELIABLE BAD))
           (id_number ?S_BAD))
   ?F <- (track (sensor ?S&:(eq ?S ?S_BAD))(fh ?FH&:(eq ?FH F))(rank ?R))
   =>
   (bind ?R (max (- ?R 10) 0))
   (modify ?F (rank ?R)(fh T))
);bad_sensor
```

The first construct, *sensor*, is a CLIPS template for representing a sensor. The four sensor facts are instances of this class which can be asserted or retracted as the reliability changes. The rule *bad_sensor* performs modus ponens reasoning by looking for a fact about any unreliable sensors and matching it to any tracks that came from that sensor. If a match is found, then the rank of that track is downgraded by 10% to reflect the reduced confidence in the data. This method of adjusting a tracks ranking based on the current set of facts is the general process followed by all of the rules in the evaluator.

As a second example, the halo rule is considered. The experts will ascribe more confidence to a track if it can be associated with other good tracks for the same satellite. Several factors go into the evaluation including the total number of tracks involved, the sensors they came from, and the satellites they were originally correlated to by the sensors. The effect is that a group of good tracks reinforce each other and that other tracks, mediocre taken by themselves, receive improved rankings if they are similar to good tracks. Obviously, this halo effect is context sensitive and beyond the capabilities of the evaluation function which can consider only one track at a time.

Several halo type rules are implemented in the system. The following one accommodates short tracks with only one or two points being similar to longer tracks.

Note that for this rule to fire, both tracks must come from the same sensor, the good track must be longer than two points (indicated by P > 20), and the good track must be of higher ranking itself (R2 > R).

```
(defrule halo-short_track
  (declare (salience 700))
  ;Advance rankings for 1-2 point tracks that are close in time
  ;to good tracks. Ranking of short track is set equal to longer if
  ;     - Obs came from same sensor
  ;     - The longer track has at least 3 points
  ;     - The u, v, w errors are approximately the same
  ;     - The tracks are within an hour of each other. This should
  ;       be refined as better epoch data is passed to CLIPS.
  ?FLAGS <- (flags (halo T))
  ?F <- (track (points ?P&:(< ?P 21))(julian ?J)
              (satellite ?SAT)(sensor ?S)(rank ?R)(hour ?H)(w ?W))
  (track (satellite ?SAT2&:(eq ?SAT2 ?SAT))
         (sensor ?S2&:(eq ?S2 ?S))(points ?P2&:(> ?P2 20))
         (hour ?H2&:(< (abs (- ?H2 ?H)) 1))
         (julian ?J2&:(eq ?J2 ?J))(rank ?R2&:(> ?R2 ?R))
         (w ?W2&:(approximately_equal ?W ?W2 .10)) )
  (not (track (julian ?J)(satellite ?SAT)(sensor ?S)
              (rank ?R3&:(> ?R3 ?R2))))
  =>
  (modify ?F (rank ?R2)(halo T))
);halo-short_track
```

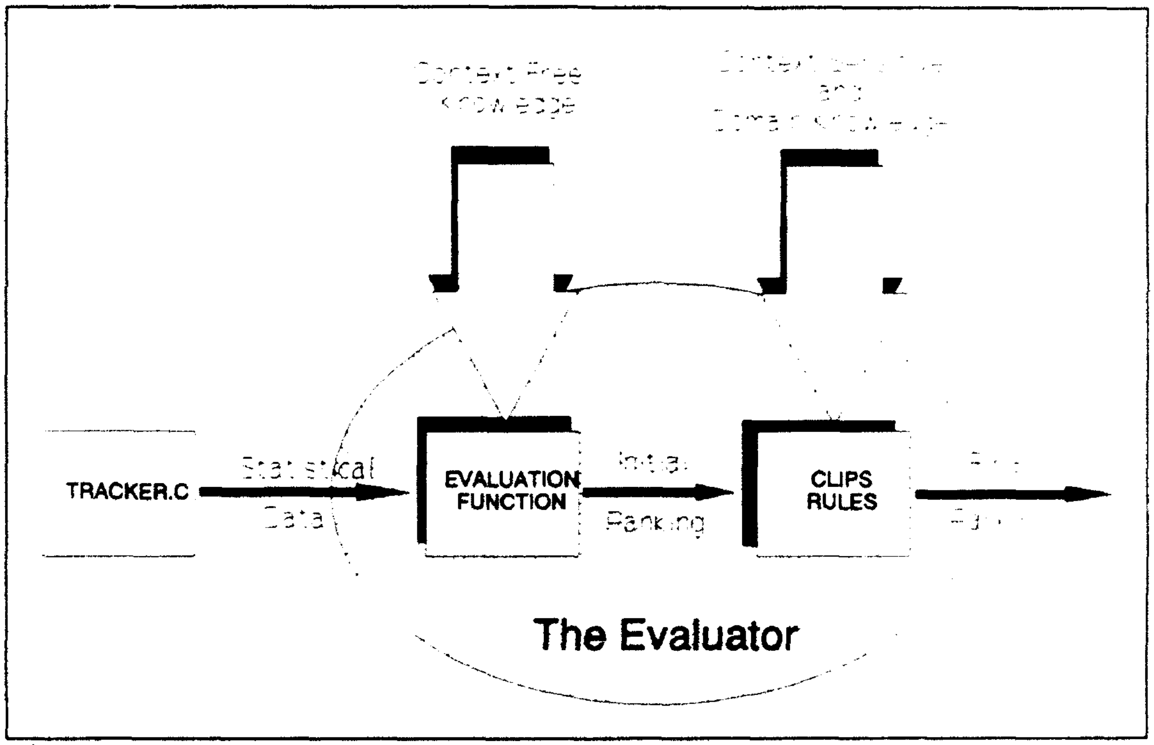


Figure 5. The Evaluator

d. Implementation

Figure 5 presents a conceptual view of the evaluator. The evaluation function bases its ranking of each track on the eight attributes in Table 2. These attributes are provided by the preprocessing routine TRACKER.C which has mapped them into the continuous range of (0,1). The output of the evaluation function, a percentage from 0 to 100, is a measure of worthiness with 100% being the best score and 0% the poorest. The coding of the evaluation function is straight forward, requiring only three lines of C code.

TABLE 2. EVALUATOR FEATURE SET

PARAMETER	REMARKS
Satellite Drag	Orbital decay rate
Satellite ID	TRUE if original sensor tag matches current satellite
Satellite Period	The orbital period
Points	Number of points in the track
ΔW>10	The number of individual ΔW errors in the track greater than 10
ΔU	The RMS error along the U axis of the points in the track
ΔV	The RMS error along the V axis of the points in the track
ΔW	The RMS error along the W axis of the points in the track

Regardless of evaluation function score, all tracks are passed to the production system to determine a final ranking. Applying domain knowledge not available to the evaluation function, the knowledge based system adjusts the rankings to produce the final output.

As a whole, the evaluator makes best advantage of the individual strengths of the two paradigms. The evaluation function applies the empirical, context free knowledge to the data. Through its compensatory grading algorithm and ability to handle continuous data, it overcomes potential boundary problems and system fragility. The production system then applies the domain dependent, context sensitive knowledge to the data. Using rules with conjugative clauses, it allows for interdependencies in the available facts. The result is a system that employs statistical analysis and connectionism with logical reasoning and symbolic computing.

2. The Synthesizer

a. Solutions By Synthesis

Once a track is deemed acceptable, the task remains of fitting it to the database. Using a least means square algorithm, effort centers on finding the orbit that most closely fits a given set of tracks. Initially, the original element set for the object is used to propagate a curve. Based on the fit error between each observation and this curve, the expert makes decisions on which tracks to keep and which to ignore. This new set of tracks is then used to determine a new element set and, by propagating another curve from this new element set, another set of fit errors is computed. The expert

continues to refine the selection of observations until a suitable orbit is found. (Naval Space Surveillance Command, 1990, p. 5)

As shown in Figure 6, the above process is dynamic with the element set effecting the fit of the tracks and the selection of tracks effecting the element set. The solution is found by synthesis with the expert proposing alternate sets of tracks in an attempt to converge on a single answer.

b. MANDC

The primary tool used to guide the experts to a solution is the software routine Manual Differential Correction (MANDC). MANDC computes the effects of tracks and element sets on each other and presents the results to the orbital analyst for consideration. As an example, consider the following MANDC output:

```
SAT.NO.= 21429    IN.DESIG.=91 043 D    ORIGIN=USSR      TYPE=R.B.
921025   152332.08 -21.88    7.40    0.00  2231     294  309.72  47.63       0.00
921026   120920.47  -9.75   29.48   -3.77  2231M    295  323.06  30.39       0.00
921030   201006.93   4.72    9.38   -3.98  2231A    296  138.55  20.90    3703.52
921030   201058.98   5.41   10.82   -4.18  2231M    297  136.22  23.11    3747.95
921030   201207.05   2.81   10.62   -1.11  2231E    298  133.11  25.79    3816.20
921031   203159.65   7.59    8.02   -1.44  2231E    299  156.37  17.48    3439.94
921031   203321.58  10.19    9.07   -1.79  2231E    300  153.01  22.04    3462.54
921031   203449.61   7.87   11.25   -2.40  2231E    301  149.19  26.67    3510.71
921031   203719.19  10.11   12.38   -2.46  2231E    302  142.06  34.11    3653.89
921031   203745.07   9.33   11.36   -2.46  2231E    303  141.31  34.76    3671.63
921031   203913.05  10.00   14.34   -2.75  2231E    304  137.20  38.28    3779.95
  SATELLITE=21429  EPOCH=921031  203913.05  SET NO.=  384.  REV NO.=  988.
PERIOD    PDOT      M3        ECC    INC     RA       AP       RADOT    P/HT  A/HT
732.247  0.00000  0.       .7317  63.21  277.70  283.54     -.13    455.  21718
732.247  0.00000  0.       .7317  63.21  277.70  283.54     -.13    455.  21718
TOL=100.  %=100.0  RMS= 11.07  SPAN=  6  ITER=  0  %SN= 77.1
    11001111  SIG TO NOISE          9.97
    00000000   1,    2/  2,     3/   4,    4/  8,    6/  16,     7/
21429  921031203913.046   732.247489   0.00000000   0.            .73166692
21429   63.20871  277.70211  283.53852  13.46930  91   143 D  2  3  988  384
```

The first line, basic information about the identify the object, is followed by several lines of observation data. This information includes the epoch of the observation along with the ΔU, ΔV, and ΔW errors associated with the fit. Below the observations are two lines with column headings of PERIOD, PDOT, M3, ECC, INC, RA, AP, RADOT, P/HT, and

A/HT. Of these, the expert is most concerned with the satellite's period (PERIOD), the satellite's drag (PDOT), and the orbital inclination (INC). The first line of data is information currently stored in the orbital catalog about the object. The second line is changes in that information that will take effect if the experts current selection of tracks is used to generate a new element set. As various sets of tracks are attempted during the synthesis process, these two lines can be monitored to determine the impact of the changes. One final piece of information is labelled RMS and represents the root mean square error between the latest curve and the set of tracks.

c. *Rules Guiding The Synthesis Of A Solution*

Several rules are used by the experts to reach a final combination of orbital elements and tracks. The overall goal is to minimize RMS while keeping the decay

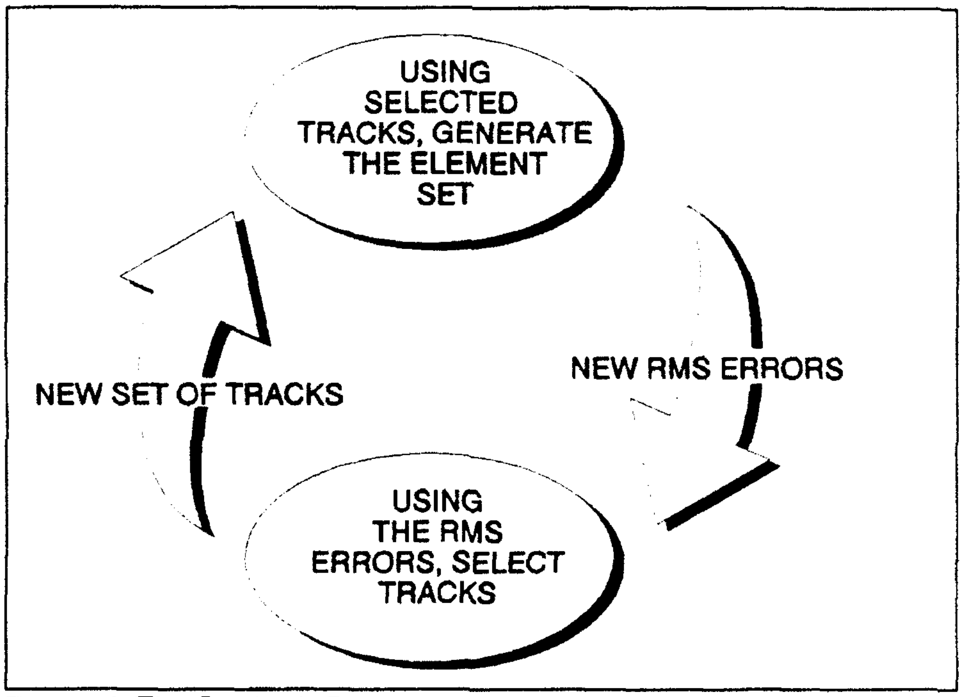


Figure 6. The Synthesis Process

(PDOT) and inclination (INC) reasonable. An acceptable RMS is one that is less than 1% of the orbital period so that, for example, a geosynchronous spacecraft with period 1,440 minutes requires a RMS of less than 14 (Jenkins, 1992). With this RMS, PDOT must be reasonable which means it can not be positive, an indication that the satellite's energy is increasing. Nor can PDOT change in magnitude a great deal, unless the object is approaching reentry into the earth's atmosphere. In like manner, INC must be reasonable. Inclination is a parameter that varies very slowly, consequently the final INC can be no more than a degree different from the initial one.

A fit is made by adjusting the span of tracks that MANDC uses to generate an element set and associated orbit. The orbital catalog maintains at least the last 75 observations, however due to the ever changing element set only the last few are useful for determining the current orbit of the object. Defaults are built into MANDC for selecting a span which the expert overrides to improve the fit. Spans are continuous, covering all observations from some starting time to the present.

Confidence in an orbit increases as more tracks are used to build it, consequently when selecting a span the maximum number of observations possible are used. As a minimum, a span of three tracks is required to achieve any meaningful results. In addition to the number of tracks, the expert must also consider the time interval covered by the span. Three tracks within ten minutes of each other produce a span with an acceptable number of tracks but an unacceptable time duration. Preferably, the span will cover a few days time.

Besides changing the start time, the experts can modify a span by deleting some of the tracks in it. This must be done with care, since eliminating a track means it was incorrectly correlated to this object sometime in the past. However, in situations with a large number of tracks that fit well and a single poor one, it may be prudent to remove the errant observations.

While other procedures are used by the experts in an attempt to improve the fit of the data, the majority of effort centers on selecting a correct span.

d. *General Solution*

As originally envisioned, the synthesizer portion of the expert system would perform the task of fitting tracks to the database. To work properly, repeated calls must be made to MANDC. Unfortunately, MANDC is currently operative only on NAVSPASUR's computer. Runtime access to this system was not available and modifying the program to operate on another system is a software engineering challenge beyond the scope of this thesis. Consequently, no CLIPS rules were developed and tested. However, a general solution algorithm is provided that captures most of the information gained from the experts.

The main loop is shown in Figure 7. After adding the new track, repeated calls are made to the MANDC routine. The calling loop is exited when the fit is satisfactory or no progress is being made. For a satisfactory fit, the magnitude of RMS should be less than 1% of the period, the new PDOT should be approximately equal to the old PDOT, the new PDOT should be less than zero, and the new INC should vary from the old INC by less than a degree. The other exit condition, NO PROGRESS, occurs when several iterations through the loop fail to decrease the magnitude of RMS.

The next line in the loop adjusts the span after checking if the fit is close. If the fit is less than roughly 150% of the acceptable value, the experts will not adjust the span but rather will continue to call MANDC to see if RMS will decrease on its own. Multiple calls to the subroutine refines the element set and has the potential of improving the fit of the tracks. The expert will continue to iterate as long as it appears an acceptable RMS will ultimately be achieved.

Lacking a RMS that is close, the expert will adjust the span. Whether the span is lengthened to include more tracks or shortened to hold fewer depends on the

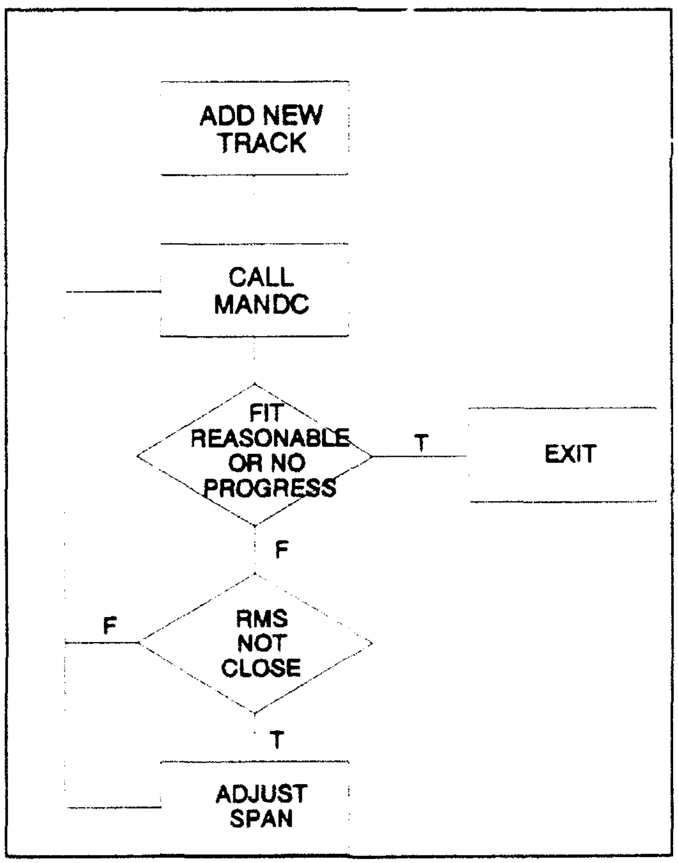


Figure 7. The Main Loop

data. If the default span provided by MANDC has few observations, the expert will tend to lengthen it and vice versa for a span with many observations. Shorter spans are generally used on satellites with a high decay rate, but rarely are they shortened below the 3 track minimum. Again, the goal is to achieve a satisfactory fit while retaining as many tracks as possible.

If adjusting the start point of the span does not yield results, tracks that do not fit well will be examined an potentially eliminated. A poorly fitting track is noted by ΔU, ΔV, and ΔW errors much higher than the average for the span.

The expectation is that repeated adjustments of the span will produce an acceptable fit. If it does not and no progress is being made, the experts differ on a next course of action to follow. If PDOT is causing problems, the expert may set its value at 0 and force MANDC to perform calculations without orbital decay. Alternately, a different element set can be used. The orbital catalog actually contains four element sets from various sources for each object. Usually, the experts work with NAVSPASUR's own internally generated element set, but using one of the others may lead to a solution when the NAVSPASUR one does not.

Should all these efforts fail, a track will eventually be ruled as not belonging to the object and returned to holding file for reconsideration the next day.

V. DERIVING THE EVALUATION FUNCTION

A. EMPIRICAL LEARNING

Shown graphically in Figure 8, classification describes a real world instance in terms of features and then uses those features to make an assignment to a class (Hirsh and Shavlik, 1992). Given **n** features and **m** classes, the function $\mathscr{F}$ performs a mapping from the **n**-dimensional feature space into the **m**-dimensional class space

$$\mathscr{F} : \Re^n \to \Re^m$$

Evaluation can be viewed as a type of classification where **m** equals one, so there is only one class and membership in that class is continuous vice discrete.

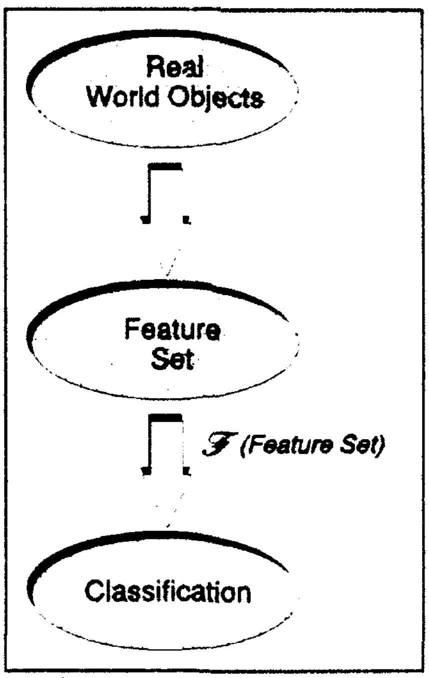


Figure 8. Classification Process

As applied to classification, machine learning employs an automata to find the function $\mathscr{F}$. This implies using the computer to determine the relationship between a set of features and membership in a class. Specific to developing an evaluation function for ranking satellite tracking data, the computer must ascertain how drag, satellite period, and other factors impact the quality of a given track.

One method of machine learning, inductive learning, presents the computer with a large number of positive and negative examples that are used for training. The examples serve as input/output pairs from which the machine induces the function relating the two. For classification, the input consists of features or attributes while the output is the known class of the particular example. Through repeated exemplars, the relationship between the feature set and the classification is uncovered. Once successfully trained, novel and unknown instances can be accurately classified using the learned relationships. (Hirsch and Shavlik, 1992)

With inductive learning, knowledge acquisition focuses on the data vice the expert. Although they must still provide the set of examples for training, the expert's involvement with the knowledge engineering phase is reduced and often indirect. This lessens the knowledge engineers need for access to the specialists, freeing the experts to pursue other tasks. In addition, the functions and relations found through machine learning tend to be simpler and more general than those produced by humans. While the computer is unbias, experts often have preconceived notations sucn that they "can not always see a simple pattern or principle, and often suggest overly complex rules when they describe what they think they ought to do, rather than what they actually do" (Hart, 1986, p. 112).

Past endeavors in inductive learning include ID3 which used statistical analysis to produce a rule base for a production system (Hart, 1986, p. 114). Another approach that derives rules, AQ, resulted in an system for diagnosing soybean diseases that out performed the hand coded expert system (Hart, 1986, p. 112). Recently, research has expanded into the fields of genetic algorithms and artificial neural networks, both of which work well with continuous and numerical data.

B. ARTIFICIAL NEURAL NETWORKS AS CLASSIFIERS

1. Vector Quantization

Geometrically, the feature set used to describe an instance is a **n**-dimensional vector. A vector quantization algorithm will map a potentially infinite number of these feature vectors into a **n**-dimensional hyperspace such that they cluster around a set of **m** codebook vectors. The goal of vector quantization is to reduce the complexity of the input by mapping it from **n** dimensions into a lower dimension space. This grouping of vectors then permits a more convenient analysis of the original data. (Merelo, 1991)

For classification, effort centers not so much on reducing the complexity of the input data as to the assignment of feature vectors to the correct cluster and associated class. Consequently, the dimensionality of the problem may increase if there are more classes than there are features, i.e., **m** > **n**. Despite this difference, the underlying mechanics are the same and focus on selecting an appropriate set of codebook vectors. In its simplest form, one codebook vector exists for each of the **m** classes and, as shown in Figure 9, points to the center of the region in **n** hyperspace where that class resides. The codebook vector is a quantized representation of that class; it is a prototype vector

that defines the class. Vector quantization reduces the classification problem to one of finding the prototype vectors for each class. (Kosko, 1992, p. 112)

2. Learning Vector Quantization

One method for determining the codebook vectors is by learning vector quantization (LVQ). Originally proposed by Kohonen (1988), it uses inductive learning to train a neural network as a classifier. The training process results in the quantized vectors for the various classes being embodied in the weight matrix of the neural network. Training is accomplished through competitive learning, a substantially different approach than the more common back propagation algorithm. Under competitive learning, neurons in the hidden layers of a neural network respond to an input by contending with each

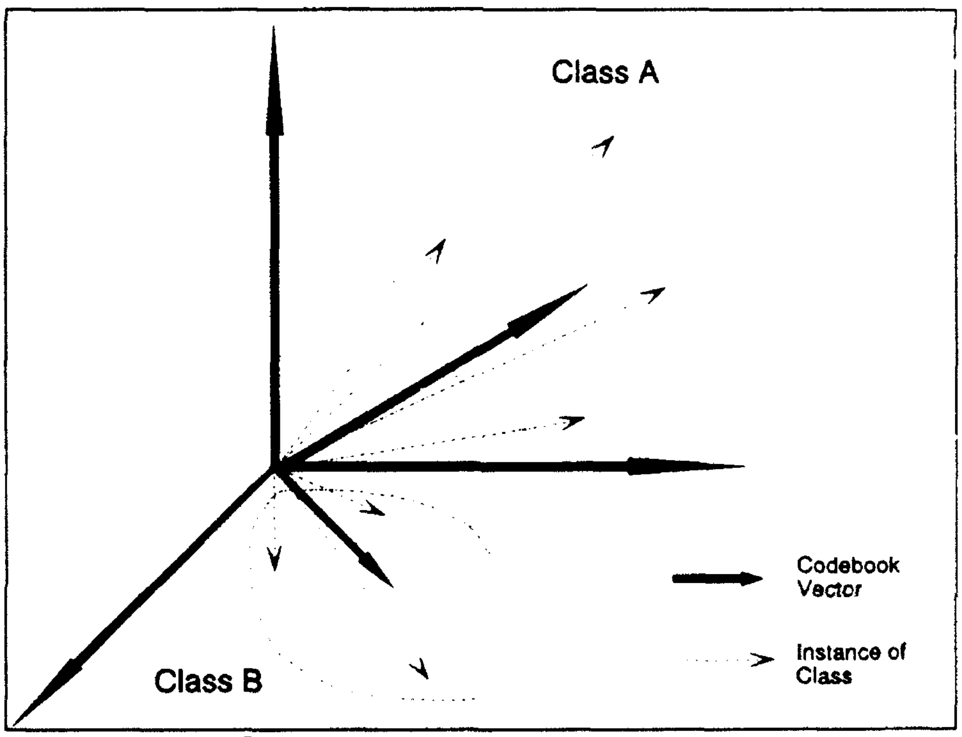


Figure 9. Vector Quantization

other until the strongest one wins. The winner then adapts itself in such a way that it will respond more strongly the next time the same input pattern is presented.

Kohonen's LVQ network uses an input, output, and single hidden layer. The input layer is composed of **n** nodes, one for each feature, while the output has **m** nodes, one for each class. These layers are connected to a hidden layer divided into clusters of equally numbered neurons. There is one cluster per output node, therefor the number of hidden clusters also equals the number of classes.

Figure 10 is a sample LVQ network. It assumes four input features and three output classes. Three nodes have been arbitrarily assigned to each of the hidden clusters;

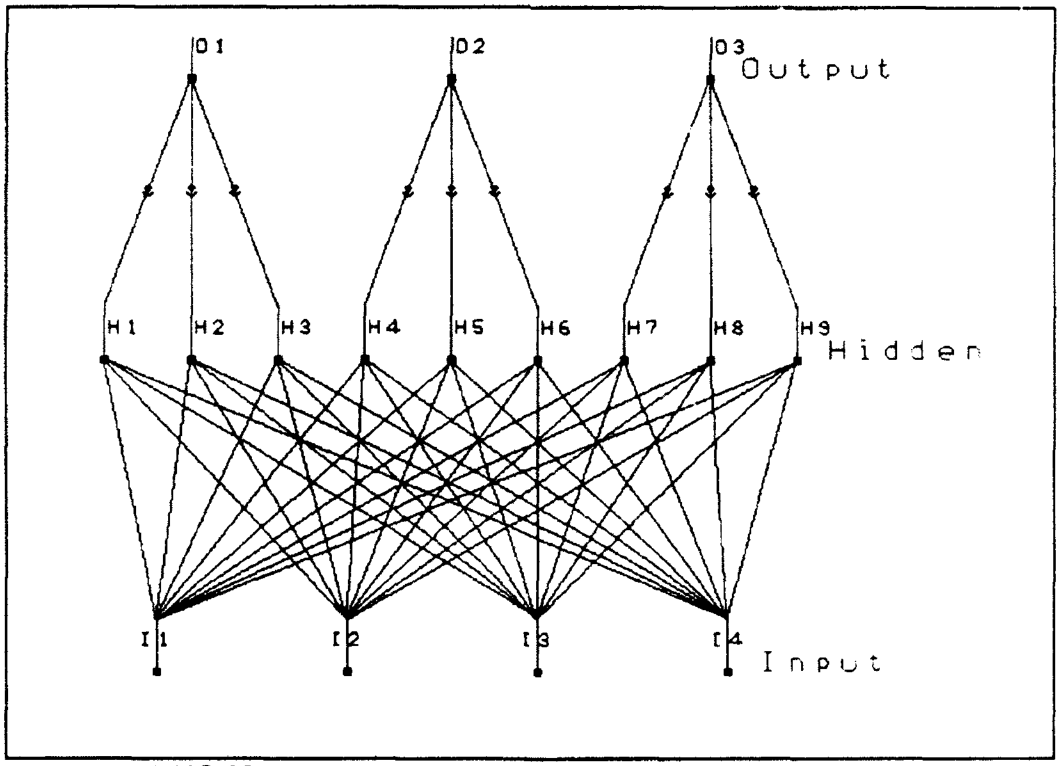


Figure 10. LVQ Network

the actual number necessary depends on the complexity of the problem. During training, an input pattern is presented to the first layer which distributes it to the hidden nodes. The hidden nodes activate in response to the input. The neuron with the highest activation wins and becomes the only node to train during the current iteration. The weights on the connections coming into the neuron are adjusted according to the learning formula

$$\vec{w}'_j = \begin{cases} \vec{w}_j + \alpha(\vec{I}-\vec{w}_j) & \textit{if winning neuron in correct class} \\ \vec{w}_j + \alpha(\vec{I}+\vec{w}_j) & \textit{if winning neuron in incorrect class} \end{cases}$$

where
$\vec{w}'_j$: *weight vector for jth neuron after training*
$\vec{w}_j$: *weight vector for jth neuron prior to training*
$\vec{I}$: *input vector (the feature vector)*
α : *learning rate*

As shown in Figure 11, the effect of training is to move the winning node's weight vector towards the input pattern if the winner belongs to the same class as the input. Otherwise, the winner is repulsed away from the input.

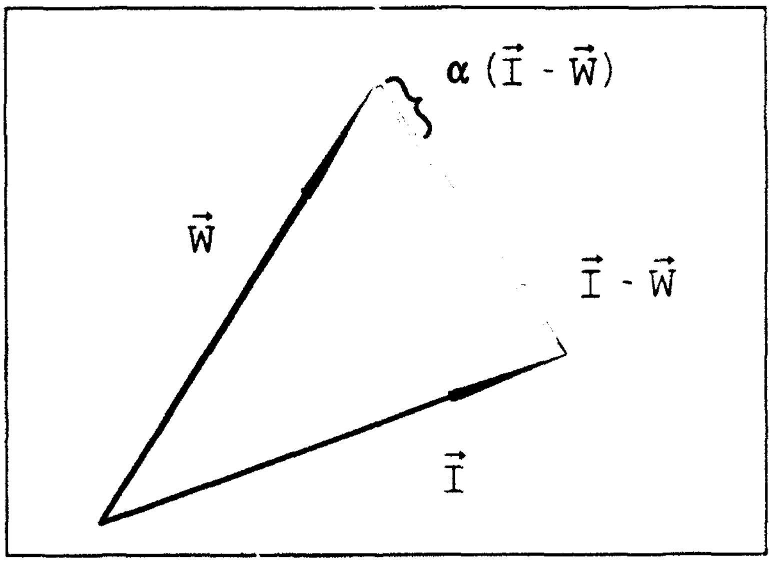


Figure 11. Effect of Training

Activation of the hidden nodes is based on euclidean distance

$$a_j(\vec{I}) = \left[\sum_{k=1}^{n} (w_k - i_k)^2\right]^{\frac{1}{2}}$$

where
a_j : *Activation of jth neuron*

The winning node during each iteration of training is the one with the smallest distance. Consequently, the LVQ network works as a nearest neighbor classifier, with the weight vector closest to the input pattern producing the highest activation. Repeated training adjusts the weights of the hidden nodes until they point at the centroid of the example vectors that make up a class. The weights converge to a mean average and thus become the vector quantization, or codebook, for the class.

The existence of multiple nodes per cluster implies multiple codebook vectors per class. The need for more than one neuron occurs when complicated boundaries exist between classes, shown in two dimensions in Figure 12. Alternately, the different nodes

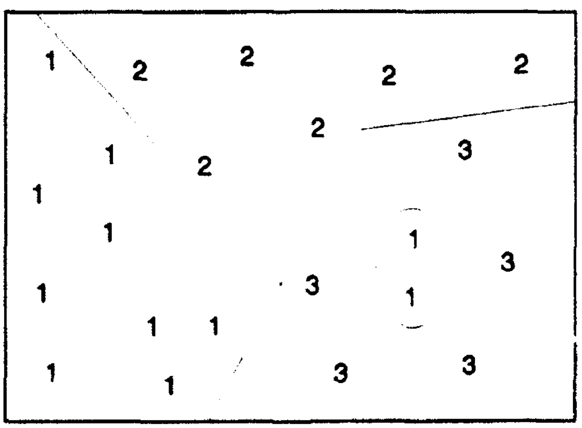


Figure 12. Complex Class Areas

in a single cluster may be viewed as subclasses of a larger class. Regardless of the interpretation, the effect of the output layer is to gather up the nodes of a cluster into a single class. In the LVQ network, the output also performs a binary mapping with the node associated with the selected class producing a 1 and all other nodes a 0.

Selecting the correct number of neurons for the hidden layer is problematic. The optimum solution will choose enough nodes to properly define a class and no more. If too many are used, the network will have the capacity to "memorize" each input rather than learning. As fewer nodes are retained in the hidden layer, the network is forced to generalize and subsequently forms the desired prototype vectors for each class. In the limiting case, only one node is used per cluster, producing only one prototype vector per class and the most general solution possible.

The LVQ network requires more than one node in the output layer to permit differentiation between a minimum of two classes. This presents some problems for evaluation, since the goal is to find the degree of membership in a single class. The solution lies in dividing the training set into two groups, those that are considered a member of the class and those that are not. These groups can be called **Accept** for the positive examples and **Reject** for the negative, although in reality all the examples are acceptable and rejectable to varying degrees. The network is then trained on the examples using this crisp, discrete membership.

C. CORRELATION AND FUZZY SETS

Mathematically, correlation refers to the degree that two sets of data vary linearly with each other. It is measured by the correlation coefficient which resides in the range

(-1,1), varying from negative correlation (one set of data increase as the other decreases) through no correlation (no linear relationship) to positive correlation (both sets increase together).

Because it uses competitive learning with a metrical activation function (the euclidean norm), the LVQ network is a classical correlation detector (Kosko, 1992, p. 147). Although it does not compute correlation coefficients directly, the neural network does provide an empirical assessment between the existence of a feature and membership in a class. This implies that the performance of the LVQ network will improve as the relationship between input features and output classes becomes more linear.

As an example relevant to UCTs, drag is considered. Assuming that a given drag has a given effect on the acceptability of a track, for correlation it is desired that twice the drag have twice the effect. However, this is not the case. When evaluating drag, the experts are influenced by changes in order of magnitude vice linear changes (Jenkins, 1992).

Through the use of a fuzzy set membership function, a mapping is possible that captures the relationship between drag and acceptability of a track. The experts consider drag in the range -.0000 to -.0099 as average, -.0100 to -.0999 as high, and -.1000 and above as very high. Using these divisions, a fuzzy set for drag is

$$DRAG = \{x, \mu_A(x)\} \qquad x \in X$$

$$\mu_A = \begin{cases} -\dfrac{\log(-x)}{4} & x < 0 \\ 0 & otherwise \end{cases}$$

where
X : *the continuous space for drag,* 0 *to* $-1x10^4$
x : *an instance of the set X*
DRAG : *The fuzzy set of low drag*

The use of the membership function is intuitive and works well with continuous data. Since it maps the drag linearly into a range of (0,1), it makes for easier qualitative analysis of the data. With fuzzy sets, a drag of 0.50 truly is twice as high as a drag of 0.25. The membership function must comply faithfully with a priori knowledge of the set; other than this constraint, its selection is somewhat arbitrary.

D. EXTRACTING THE EVALUATION FUNCTION

With training completed, the neural network's weights can be used to build an evaluation function. Once the evaluation function is determined, the network can be dispensed with. A fuzzy set interpretation is convenient here and will be used in the derivations. The weight vector for the jth hidden node is

$$\vec{w}_j = [w_1 \; w_2 \; w_3 \; \ldots \; w_n]$$

where
w_n : *Weight of connection from nth input node to current node*
n : *Total number of input nodes, equal to the total number of features*

Assume an arbitrary instance to be classified with a feature vector given by $\vec{I}_j = [i_1 \; i_2 \; i_3 \; \ldots \; i_n]$. The degree of membership in the class represented by the jth node becomes

$$\mu_j(\vec{I}) = 1 - \frac{\left[\sum_{k=1}^{n} (w_k - i_k)^2\right]^{\frac{1}{2}}}{S}$$

where
μ_j : *Membership function for jth class*
S : *Scale factor*

The summation is the euclidean distance between the feature vector and the class' quantization vector. The scale factor normalizes the distance and is equal to the maximum possible value the summation can assume. If multiple neurons are assigned to a single cluster, and therefor to a single class, the membership function is the fuzzy union of the individual membership functions

$$\mu_{CLASS}(\vec{I}) = \mu_j(\vec{I}) \vee \mu_{j+1}(\vec{I}) \vee \ldots \vee \mu_{j+l-1}(\vec{I})$$

$$= MAX[\mu_j(\vec{I}), \mu_{j+1}(\vec{I}), \ldots, \mu_{j+l-1}(\vec{I})]$$

where
μ_{CLASS} : *Class membership function*
μ_j : *Membership function for the jth subclass*
l : *Total number of neurons (i.e., subclasses) in a cluster*

The output layer of the LVQ network requires a minimum of two neurons and produces binary outputs to indicate the classification of an instance. Conversely, the output of an evaluation function is a single number whose range is continuous. As described above, a fuzzy set membership function based on the euclidean distance provides the desired continuity.

The problem of a single output must still be addressed. Since the network was trained on two classes, again arbitrarily designated **Accept** and **Reject**, one choice is to use an instance's membership in the class **Accept** as the evaluation function

$$\mu_{GOOD} = \mu_A$$

where
μ_{GOOD} : *Membership in the class of good tracks*
μ_A : *Membership in the Accept class*

This approach is somewhat unsatisfying, since it ignores any information about the membership of the instance in the **Reject** class. Consider the situation portrayed in Figure 13, where two feature vectors $\vec{I}_1$ and $\vec{I}_2$ are being evaluated. This example shows two quantized vectors for each class. Assuming $\mathbf{d}_1$ approximately equal to $\mathbf{d}_2$, the two feature vectors would have equal membership in the **Accept** class and would be evaluated as the same. However, the distance from $\vec{I}_2$ to the **Reject** prototype vectors is greater than the distance from $\vec{I}_1$ to **Reject**. A more intelligent membership function would take advantage of this information and realize that the second vector has less in common with the **Reject** class than the first. This suggests an evaluation that uses the fuzzy set difference between the two classes:

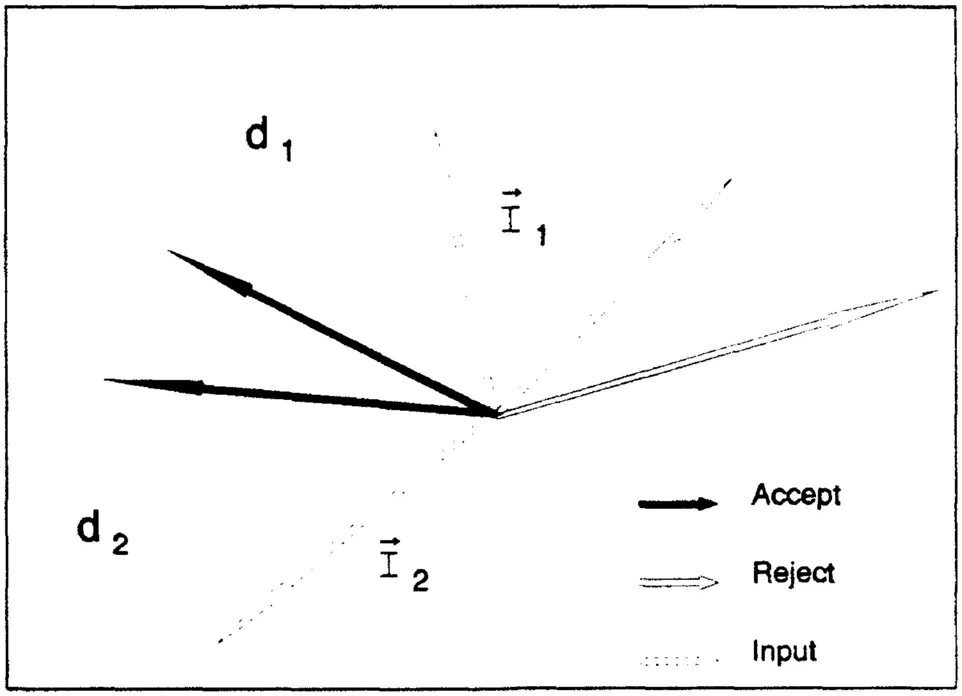


Figure 13. Class Membership

$$\mu_{GOOD} = \mu_A - \mu_R$$

where
μ_{GOOD} : *Membership in the class of good tracks*
μ_A : *Membership in the accept class*
μ_R : *Membership in the reject class*

Since μ_A and μ_B both have a range of (0,1), μ_{GOOD} has a range of (-1,1). This can be mapped back to (0,1) by offsetting and scaling the function

$$\mu_{GOOD} = \frac{1 + \mu_A - \mu_R}{2}$$

E. FUNCTIONAL LINKS

The activation of the neurons is based on the euclidean norm, a non-linear function which contains powers of dependent variables but no products. As such, the LVQ network can not account for joint attributes: features that taken alone have one meaning but when considered together have another. Consider a network for classifying overweight people. Looking only at the feature **height** with a value of 5' 2" tells the system nothing about whether an individual is overweight. Likewise, the feature **weight** with a value of 170 lbs conveys only the idea that the person is big. However, taken jointly, the two features provide a basis for classification. The true impact of these features comes from their conjunction, not their individual values.

Without modifying the network, there are two ways to accommodate joint attributes, either prior to the LVQ network or after it. As shown in Figure 14, the first method requires passing the feature set through the network and then handling the joint attributes with some type of post-processing algorithm. For UCTs, the rule based system

already exists to apply domain knowledge and could be expanded to cover this situation. A second method is to operate on the feature set first and then convey the results to the network. This is the approach taken with functional links.

Functional links were originally proposed as a method for providing more information to a neural network (Klassen, 1988). By applying non-linear operators to the input, the data complexity increases while the network complexity decreases. Figure 15 shows how the exclusive-or network, using the identity function for activation, can be simplified by the addition of the non-linear input, x_1x_2. Various non-linearities have considered such as products, powers, and fourier expansions of terms.

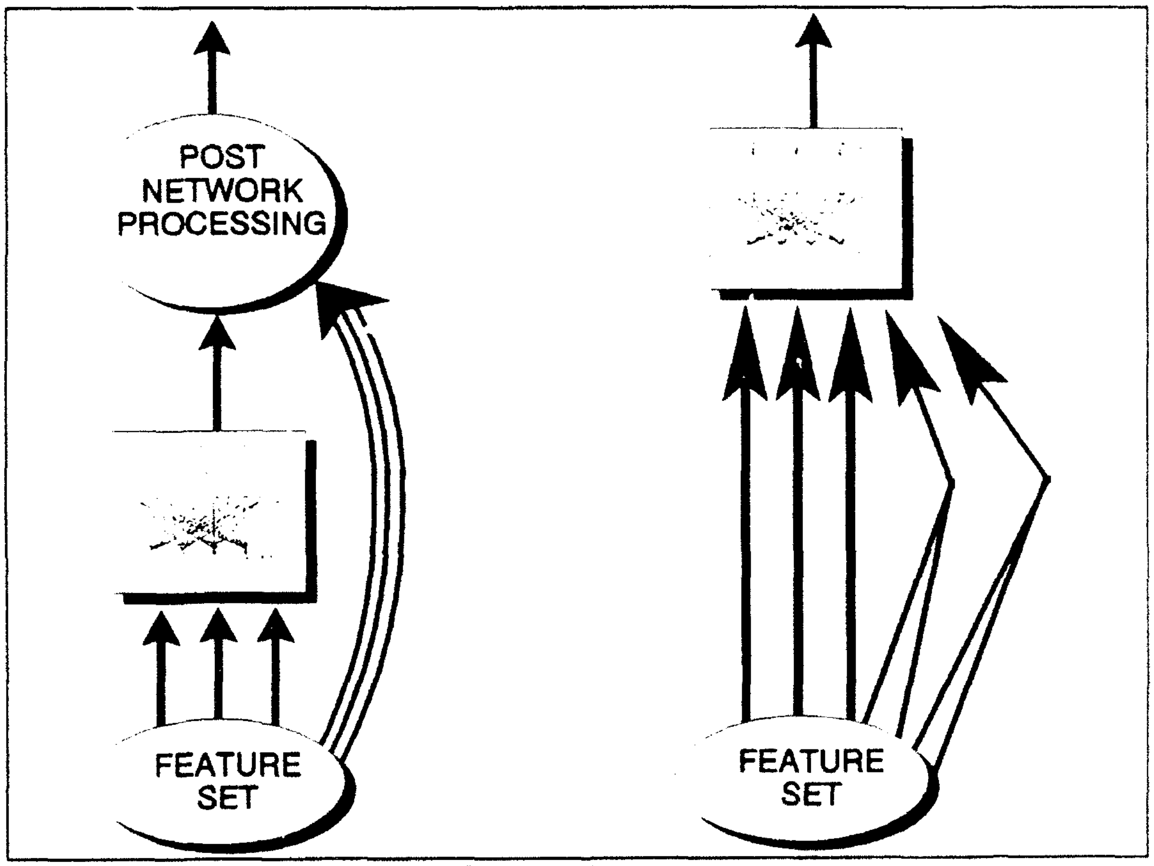


Figure 14. Alternate Methods for Joint Attributes

In similar fashion, functional links can provide a conjunctive term that can account for joint attributes and contextual knowledge. The effect is the same as the **AND** clause in an expert system rule, though the application is limited strictly to the feature set. Unfortunately, like much of the design work associated with neural networks, there are no set methods for determining which non-linear combinations are pertinent. Guidance must come from knowledge engineering or trial and error.

F. IMPLEMENTATION

1. Membership Functions

Membership functions for fuzzy sets are contained in the preprocessing C routine TRACKER.C, which maps the features used by the evaluation function (and the

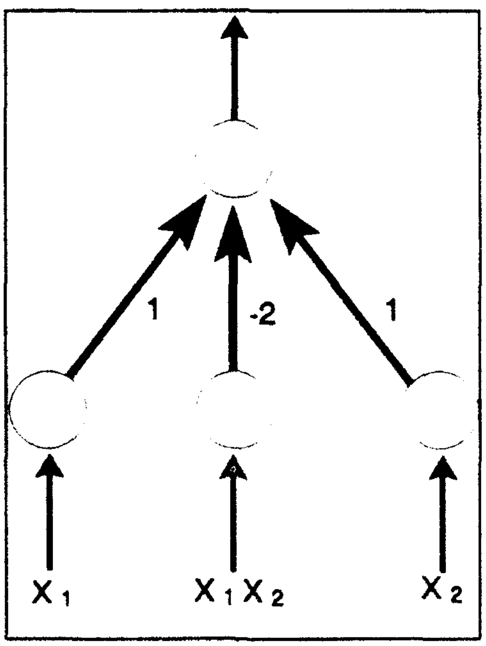


Figure 15. Simplified XOR

neural network) to the range (0,1). Based on principles developed during the knowledge engineering phase, determining the functions turned out to be a straight forward process.

2. Training Data Set

For proper training, the LVQ network requires a data set that contains an equal number of examples from each class. For the UCT problem, this dictates an equal number of good and bad tracks. The sample set from the SID contains 1445 tracks, however only 150 were deemed good by the experts while the vast majority were rejected. In addition, several of the good examples were selected not for their feature set, but for reasons dictated by other domain knowledge. For example, observations from sensor 369 are generally accepted as valid regardless of the ΔU, ΔV, and ΔW errors. These tracks had to be screened out of the training set so as not to provide contradictory information to the network. As a result, the final training set contained 230 examples from which the network could learn.

3. Neuroengineering

Because the required size of the network can not be determined in advance, a large, complex network was built using 17 input nodes and 7 hidden nodes per cluster. Two output nodes, **Accept and Reject**, represent the two classes of tracks, good and bad. This network was then pruned to yield the minimum configuration capable of correct classifications.

To simplify the hidden layer, nodes were removed one at a time from each cluster and the network retrained. The accuracy was then plotted as a function of the number of nodes with the results given in Figure 16. Despite the higher error rate, a single

neuron per cluster was attempted because it simplifies implementing the evaluation function and guarantees a general solution, i.e., no memorization on the part of the network.

The original feature set consisted of the 17 items given in Table III. To reduce this set, the weights from a given feature to each node was examined. Unlike networks using back-propagation, the absolute value of the weights are meaningless; rather, it is the relative magnitude of weights when compared to each other that is important. If the weight from a feature to all the hidden nodes is approximately the same, then that feature is not being used to distinguish one class from another. Conversely, a large difference in weights indicates that the feature is working as a discriminator. After several iterations, the eight features in Table IV were found to be important. Two of the features, satellite period and drag, have no weights associated with them. They were not provided to the network as direct input but rather exist in functional links. These two features were known to be important to the experts when evaluating a candidate track, however the LVQ network found no correlation between them an either the **Accept** or

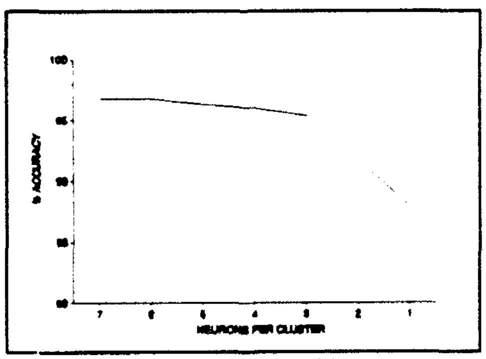


Figure 16. Accuracy vs Neurons

Reject sets. Generally, the greater the magnitude of these two parameters, the greater the tolerance for ΔU and ΔV errors. Consequently, ΔU and ΔV errors were reduced by a scaling factor based on drag and period.

The architecture of the final neural network used for deriving the evaluation function is shown in Figure 17.

TABLE III. ORIGINAL FEATURE SET

PARAMETER	REMARKS
Satellite Drag	Orbital decay rate
Satellite ID	TRUE if original sensor tag matches current satellite
Satellite Period	The orbital period
Points	Number of points in the track
$\Delta W > 10$	The number of individual ΔW errors in the track greater than 10
RMS Error	Root mean square error for the track in the three dimensions
Average Error	The average error for the track in the three dimensions
Maximum Error	The maximum error for the track in the three dimensions
Standard Deviation	The standard deviation of the errors for the track in three dimensions

TABLE IV. FINAL FEATURE SET

INPUT FEATURE	WEIGHT TO ACCEPT	WEIGHT TO REJECT
Satellite ID	.4603	.1754
Points	.6411	.3118
Satellite Period	N/A	N/A
Satellite Drag	N/A	N/A
$\Delta W > 10$	1.0214	.6962
ΔU RMS Error	.8364	.6942
ΔV RMS Error	.7368	.4871
ΔW RMS Error	.8866	. .636

4. Evaluation Function

The final weights from each feature node to the hidden layer are given in Table IV. Based on these weights, the membership functions for the two classes of **Accept** and **Reject** were determined. The scale values were found by analyzing the input data to find the minimum activation, and therefor maximum value, of the two neurons. By subtracting the two membership functions and offsetting the results, the evaluation function, called **Ranking**, was completed. The results are shown in Figure 18.

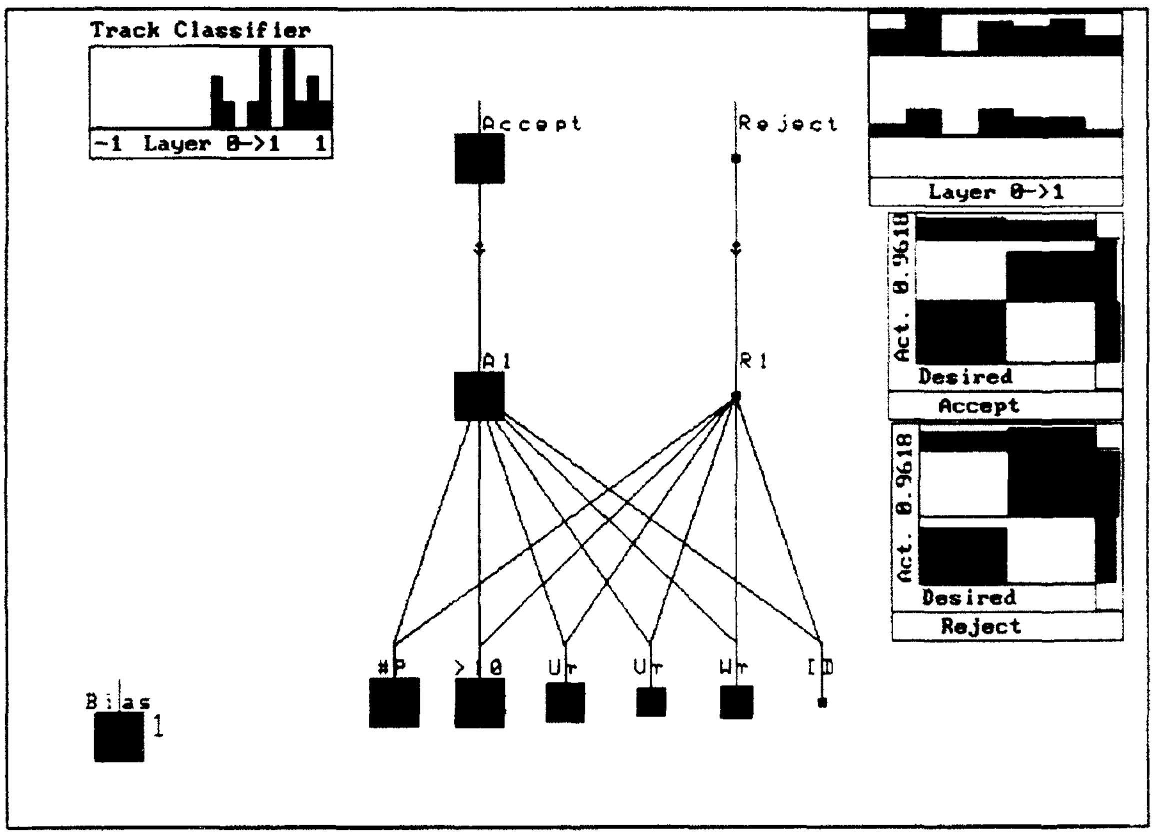


Figure 17. Final Neural Network

$$ACCEPT = [(P-.6411)^2 + (W{>}10-1.0214)^2 + (\Delta U-.8364)^2 + (\Delta V-.7368)^2 + $$
$$+ (\Delta W-.8866)^2 + (ID-.4603)^2]^{\frac{1}{2}}$$

$$REJECT = [(P-.3118)^2 + (W{>}10-.6962)^2 + (\Delta U-.6942)^2 + (\Delta V-.4871)^2 + $$
$$+ (\Delta W-.4636)^2 + (ID-.1754)^2]^{\frac{1}{2}}$$

where
P=Number of points

$$= \frac{Obseravtions\ in\ track - 1}{5}$$

W>10=ΔW greater than 10

$$= \frac{Observations\ with\ \Delta W > 10}{Observations\ in\ track}$$

DRAG=Empirical drag of the satellite

$$= -\frac{\log(-Drag)}{4}$$

ΔU, ΔV, ΔW=RMS errors in orbital coordinate system

$$= \frac{\Delta}{(\Delta_{MAX})(.10\, x\, DRAG)(PERIOD)^{\frac{1}{2}}}$$

ID=Sensor tag is equal to SID tag

=1 *if true, otherwise* 0

PERIOD=Satellite period

$$= \frac{Period\ in\ minutes}{1600}$$

Figure 18. The Evaluation Function

VI. RESULTS

A. SYSTEM PERFORMANCE

The rankings produced by the evaluator are listed in Appendix D. Generally, tracks with a rank of 50% or greater were accepted by the expert while those below 50% were rejected. Based on this observation, the accuracy of the expert system was determined with the results compiled in Table V. Two columns of data are provided, the first being a raw error rate while the second is a corrected rate that removes errors that are implementation vice system dependent.

With an accuracy of 99.1%, the overall system is very effective at ranking tracks correctly and nearly matches the performance of the human experts. Very high accuracy is necessary for the expert system to be of any usefulness. Of the 1445 tracks in the

TABLE V. SYSTEM ACCURACY

CONFIGURATION	ACCURACY, WITH REPEAT TRACKS	ACCURACY, NO REPEAT TRACKS
Evaluation Function Only	90.1	91.4
Evaluation Function with Fuzzy Logic	94.3	95.6
Evaluation Function, Fuzzy Logic, and Rule Based System	97.8	99.1

sample set, more than 1000 were obviously unacceptable, making the process of evaluating them trivial. Consequently, while greater than 90% accuracy from the evaluation function alone is impressive, by itself it can not justify replacing the human experts with a computer program. Only by approaching 100% does the system prove itself viable.

No actual rules were written for the synthesizer module, consequently there are no results for this portion of the expert system.

B. ANALYSIS OF ERRORS

1. Repeat Tracks

A percentage of the errors are not due to shortcomings in the expert system itself but rather come from repeated tracks, an anomaly that would be corrected in any implementation of the system. When analyzing UCTs, NAVSPASUR's SID program often matches the same track to multiple satellites, leaving it to the expert to make a final disposition on which track correlates with which satellite. Usually, the orbital analyst will attempt to fit the track in question to one satellite and ignore the other matchings. This can prove a problem should the expert's choice subsequently prove to be wrong and the track does not fit to the selected satellite's orbit. The approach taken by the expert system is to maintain all satellite/track pairings until the track is actually fitted. Once fitted, the repeat instances of the track are removed from further consideration.

The result is that the expert system may give a high ranking to a track that the expert does not. This does not imply that expert opinion differs from the systems, rather it means that the expert simply never considered the track because the observations had

already been used elsewhere and were no longer a concern. The repeat track errors are not errors per se, but rather a by product of the implementation that would automatically be resolved at run time.

2. Actual System Errors

Of the original errors, thirteen are attributable to discrepancies in the expert system. The observations that make up the questionable tracks are:

SAT	INC / DATE	PERIOD / TIME	DRAG / ALT	INTL DESIG / ΔU	ΔV	R.A. / ΔW	EPOCH / TAG	SENSOR
7831	73.99	117.99	-.0000	75 045	J	128.02	920211	
	920210	223448.82	910.	0.	8.	-4.	90220	395
	920210	223458.82	908.	-2.	8.	-6.	90220	395
	920210	223508.82	908.	-2.	8.	-6.	90220	395
	920210	223518.82	909.	-2.	8.	-5.	90220	395
	920210	223528.82	910.	-1.	8.	-4.	90220	395
	920210	223538.82	910.	-1.	8.	-4.	90220	395
	920210	223548.82	910.	-1.	7.	-4.	90220	395
	920210	223558.82	910.	-1.	7.	-3.	90220	395
	920210	223608.82	910.	-1.	6.	-3.	90220	395
	920210	223618.82	910.	-1.	6.	-3.	90220	395
13464	82.95	104.03	-.1067	81 053	FL	151.58	920210	
	920211	064413.52	535.	-7.	-301.	-0.	13464	399
	920211	064650.14	533.	-7.	-303.	-0.	13464	399
	920211	174723.14	494.	-35.	-561.	-1.	13464	399
15206	26.91	921.56	0.0000	84 088	F	125.50	911209	
	920210	200204.24	17259.	38.	1653.	6.	89207	221
	920210	200301.26	17326.	38.	1646.	4.	89207	221
	920210	200400.54	17396.	38.	1640.	3.	89207	221
	920210	200504.94	17471.	38.	1634.	0.	89207	221
16214	4.28	1431.15	0.0000	85 102	D	67.85	920210	
	920211	120229.50	19311.	1.	-14.	8.	83999	222
	920211	120320.58	19331.	2.	-17.	9.	83999	222
	920211	120406.11	19311.	2.	-15.	9.	83999	222
	920211	120503.94	19311.	2.	-14.	9.	83999	222
	920211	120805.44	19311.	2.	-15.	9.	83999	222
	920211	120844.16	19311.	2.	-18.	10.	83999	222
	920211	121000.75	19310.	2.	-16.	10.	83999	222
	920211	121038.61	19310.	2.	-16.	10.	83999	222
	920211	121159.66	19310.	2.	-16.	9.	83999	222
20261	82.59	115.55	-.0002	89 080	A	203.88	920212	
	920210	234322.80	1029.	-4.	-5.	-8.	90406	385
	920210	234342.89	1037.	-4.	-5.	-9.	90406	385
	920210	234352.93	1044.	-1.	-4.	-5.	90406	385
	920210	234402.98	1049.	-0.	-4.	-4.	90406	385
21538	46.70	608.03	-.4623	91 046	E	211.36	920128	
	920203	113048.14	235.	-546.	1199.	1.	21538	387
	920203	113050.09	233.	-545.	1200.	1.	21538	387
21764	40.99	615.37	-.4851	91 074	F	241.06	920208	
	920211	212636.05	4565.	147.	205.	-10.	21764	399
	920211	213727.27	5947.	140.	174.	-6.	21764	399
87117	3.90	199.68	-.0975	00 000	0	127.64	920208	
	920211	000946.59	1539.	151.	-448.	-0.	94258	399
	920211	104520.79	706.	-229.	-601.	1.	94258	399
	920211	104551.42	744.	-231.	-597.	2.	87117	399
	920211	141607.67	1634.	-250.	-528.	1.	87117	399
88079	27.00	309.94	-.0067	00 000	0	185.20	920112	
	920205	183534.10	2533.	-401.	-594.	-5.	88079	398

The source for the majority of these errors resides in the rule based portion of the system. Seven tracks were considered acceptable by the computer when in fact the

expert had reasons to reject them. Rules governing the impact of tracks on each other and the effects of epoch age are incomplete or need adjustment. With only seven errors for analysis, it is difficult to recognize the broad trends needed to write good rules covering a large number of cases. Although additional rules could be added to the production system to cover the suspect tracks, such rules would probably not be general enough to be useful. A more sound approach is to seek more examples from the experts and use them as both a method for validating the present rules and a source of guidance for writing additional rules.

The second most frequent source of errors was from the evaluation function, which places too high a value on the sensor tag matching the current satellite identification number (the *Satellite ID* feature) and not enough emphasis on the magnitude of the ΔW cartesian error (the *ΔW RMS ERROR* feature). The discrepancies are subtle, with the problem tracks having ranks around 50%. Adjustment of the evaluation function through training on additional examples would probably correct these errors.

The cause of error in the remaining tracks is unknown. When the experts make a determination in these cases, they are using knowledge that has not yet been captured by the system. The only solution to this problem is continued knowledge engineering an effort to determine what additional factors are significant. It is notable that only two tracks fall into this category, a hopeful indication that only a limited amount of additional work with the experts is necessary.

VII. CONCLUSIONS

As indicated by the success of this research, a practical expert system for correlating UCTs is achievable. The code provided here could serve as the core of an implementation, however some weaknesses still need to be addressed. While the evaluation function is very general and complete, the rule base requires additional knowledge engineering before it can be useful. Notably, the current system does not adequately account for the expert's use of satellite drag, a significant shortcoming. In addition, rules for the synthesizer need to be written so that the tracks, once evaluated, can be fitted to the database. Finally, as with any real world system, a multitude of software engineering factors must be considered before deploying the program.

Despite these reservations, the application of artificial intelligence to this problem is a success. Other conclusions regarding the specific tools and techniques used in this research are discussed below.

A. HYBRID APPROACH

An emerging trend in artificial intelligence is the use of multiple paradigms within a single application. This is a natural outgrowth of the failure of any one approach to successfully handle all aspects of knowledge and reasoning. While symbolic computing brings deep reasoning capabilities and logic to the bear on a problem, it lacks flexibility when confronted with ill-defined domains. Connectionist systems excel when working with weakly linked propositions and vague associations between facts, but have no short term

memory or reasoning capability to speak of. However, each approach can compensate for the weaknesses of the other so that a combination produces "the expressiveness and procedural versatility of symbolic systems with the fuzziness and adaptiveness of connectionist representations." (Minsky, 1991)

While a single model for encapsulating knowledge is conceptually easier to understand, at some point will breakdown in an attempt to fit information into its fixed view of the world. A hybrid approach that applies the paradigm that seems most appropriate stands a better chance of accurately representing real world problems.

B. EVALUATION FUNCTION

The evaluation function is extremely effective at eliminating boundary problems and fragility in the expert system. It also provides a certain amount of fuzziness to the system and "softens" some of the hard logic dictated by the production rules. It can deal with the multiple and weak connections between a feature set and a classification. This produces an immense savings in the number and complexity of rules needed for the rule base and uses a single algorithm to cover a large number of cases.

The inability of evaluation functions to process contextual and domain data outside the feature set was met with several approaches. Of these, mapping the features into fuzzy sets did an excellent job of linearizing the input to the neural network and improving the response of the resultant evaluation function. While they represent an interesting application, the functional links did more to confuse the implementation they were meant to clear up. The rule based production system is the most general method

for accounting for conjunctive features and should be used in preference to functional links.

C. SYMBOLIC COMPUTING

The majority of errors coming out of the expert system can be traced to the rule set. This is not indicative of some fundamental fault of symbolic computing; rather, hard problems that could not be resolved through the preprocessing C code, fuzzy sets, or the evaluation function were simply passed on to the production system where they wait to be resolved. The current rule base is small and immature. With additions and modifications, it can be expanded to improve the fidelity of the overall system.

Knowledge of first principles was critical to development of sound rules. The information gained during the abbreviated knowledge engineering phase did not provide an adequate foundation for building either the production system or the evaluation function. Prior experience in orbital mechanics, dynamics, and differential equations proved critical.

D. MACHINE LEARNING

The use of machine learning was an unqualified success. In the form of the evaluation function, it produced a more general algorithm than would have been achieved through traditional knowledge engineering. The LVQ network produces a clean deliverable, in as much as the neural network itself can be disposed of and just the evaluation function retained. The LVQ network, along with the fuzzy sets, provides some

meager support for explanation facilities since the relationships between input features and class membership is straight forward.

On the downside, getting a network trained and working properly can be difficult. Neuroengineering is still more of an art than a science with no clear paths to a solution. Since no a priori determination can be made as to whether a given network is capable of solving the problem at hand, much time can be expended with no results to show for it.

E. RANKINGS

The rankings of the individual tracks ultimately depends on the difference between two fuzzy set membership functions. There is little mathematical basis for this approach, other than it works. A more sound method would use rankings that are the conjunction of two sets, namely the subset of tracks that are members of *Acceptable* and not members of *Reject*. In fuzzy notation, the ranking would become

$$\mu_{GOOD} = \mu_{ACCEPT} \wedge \neg\mu_{REJECT}$$

Unfortunately, this membership function did not provide consistent results. It may be possible to change the membership functions for *Accept* and *Reject* in such a way as to make the above relationship valid. One possibility is to base membership on a non-linear function of the euclidean distance rather than on the distance itself. A function suggested by Kandel (1986, p. 23) is

$$\mu_{ACCEPT} = \frac{1}{e^{d}}$$

where
d : the euclidean distance
e : 2.7183...

This function was attempted without success. Some variation of it or an alternate mapping may prove fruitful.

F. FUTURE RESEARCH

1. Complete The Rule Base

Rules used to evaluate tracks need refinement to account for the few errors the system still produces. More examples from the experts may provide sufficient information to make the adjustments. A more challenging task is developing the rules that actually fit the selected tracks to the database. As previously stated, this requires access to the MANDC routine which implies that the work will have to be carried out on NAVSPASUR's own computer system. This is feasible, but presents some logistics problems.

2. Artificial Intelligence And The Brouwer Model

The expert system proposed here treats the symptom without curing the disease. The cause of most UCTs are deficiencies in the Brouwer-Lyddane algorithm itself. It may be possible to apply artificial intelligence techniques to the correlation and propagation algorithms directly, using an expert system to decide which algorithm and what degree of accuracy is suitable for a given track correlation. A customized solution could be used for each instance, starting with quick and easy attempts like Brouwer's and

then graduating to more complex solutions if the correlation fails. Another consideration would be the use of ballistic coefficients. Many of the inaccuracies in NAVSPASUR's current implementation stem from the difficulty of predicting the effect of drag. Through the tracking of an object over several days, the ballistic coefficient could be found empirically by

$$\Delta P = -\frac{6\pi^2 \rho a^2}{vB}$$

$$B = \frac{m}{C_D A}$$

where
ΔP : *change ∊ satellite period (the satellite drag)*
ρ : *atmospheric density*
a : *semimajor axis*
v : *spacecraft speed*
B : *ballistic coefficient*
m : *satellitemass*
C_D : *coefficient of drag*
A : *satellite cross sectional area*

An estimate for atmospheric density would be required. The ballistic coefficient could then be stored for use during future correlation attempts and, in its simplest form, could provide one more feature for the evaluation function to examine. Specifically, the larger the ballistic coefficient, the larger the ΔU and ΔV errors that would be tolerated. The ballistic coefficient may provide a more direct accounting of drag effects than is currently done using changes in satellite orbital period.

3. Alternate Knowledge Representations

In this thesis, symbolic processing was essentially combined with a neural network to build an expert system. This is by no means the only approach available, nor is there any indication that it is the best. Other alternatives include Baysian networks,

case based reasoning, genetic algorithms, and different neural networks architectures. Confronting the same problem with different techniques would not only give more insight into the problem domain, but also provide a comparative analysis of the effectiveness of the various approaches.

4. Improving The Evaluation Function

It may be possible to extend to evaluation function to handle a larger feature set. Currently, the standard deviation of the three cartesian errors and relative age of a track as compared to the satellite element set are factors currently processed in the rule based portion of the system. Although efforts were made to account for these features in the evaluation function, the neural network was unable to produce any sort of correlation between the features and set membership. A correlation probably exists, but too few examples were available to the network to make a determination. Further training on an expanded set of examples may provide the needed information and extend the capabilities of the evaluation function.

5. Eliminating The Preprocessing Routines

Building tracks from individual observations takes place in the C code routine TRACKER.C. The assumption was that building tracks was a straight forward, numerical process that did not require the pattern matching and inference capabilities of CLIPS. This assumption was wrong since both heuristics and some amount of reasoning goes into the decision of what constitutes a track. Many of these rules could not conveniently be implemented in C code and consequently went unresolved. A portion of the rules in the CLIPS code exist only to compensate for this shortcoming and in some cases are almost

redundant with the preprocessing code. A more consistent approach would eliminate the C code and perform all the track building and evaluation functions directly in C.

6. Implementation

The goal of any research is to see the results applied to a real world problem. The validation and verification of this expert system followed by its implementation at NAVSPASUR would be the culmination of this thesis.

APPENDIX A. BASICS OF ARTIFICIAL INTELLIGENCE

What follows is a primer of concepts and terminology used in the field of artificial intelligence. It provides a brief overview with more detailed information available in the references.

A. WHAT IS ARTIFICIAL INTELLIGENCE?

There is no strong agreement on what constitutes intelligence, consequently there is no clear definition of artificial intelligence (AI). While a proficient human chess player is considered intelligent, a thirty dollar chess playing machine from a department store is not. Conversely, a robot that could gather raw materials and replicate itself might be deemed smart, however most people do not endow earthworms with much intellect even though they routinely carry out this same function.

One definition given artificial intelligence is "the study of mental faculties through the use of computational models." (Charniak and McDermott, 1986) An alternate, proposed by Schank (1991) involves the idea of "building a machine that learns." Such a machine would acquire knowledge, evolve, and "get better over time." Covrigaru and Lindsay (1991) propose that intelligent systems are "autonomous" and goal oriented, seeking the means to achieve some ends. In their view, the chess playing computer is merely a problem solver while the reproductive robot might be intelligent. The lowly worm lies somewhere between the two.

In general, AI concerns itself with making machines do things that seem intelligent. In some respects, the ultimate goal of AI is to build a mechanical person, a goal far beyond current technology. Research in AI touches on several fields of study, all involving activities that are easy for people, but hard for computers, to carry out. Understanding spoken words (natural language interpretation), moving and manipulating objects (robotics), using common sense to figure out problems (inference), and computer vision are all areas currently being explored. Central to most problems in AI is capturing great amounts of information about the real world, storing in a convenient form, and then using some type of knowledge to interpret that data. Thus, a robotic vision system might use a television camera to take a picture of its surroundings and then "see" by using a set of algorithms that successively define lines, then build shapes from those lines, and ultimately use the shapes to recognize real world objects.

The AI field often uses specialized programming languages and tools. Traditional computer languages depend on a series of sequential steps that are carried out one at a time. Termed procedural, they use well defined algorithms and step by step programming to solve a problem. Fortran, Ada, and C are all procedural. While excellent for numerical work, they are poor at encapsulating human knowledge and emulating the way people think. On the other hand, AI languages are declarative. They emphasize writing several correct pieces of code (declaring what the program should do) and are less concerned with exactly how the pieces fit together. Lisp and Prolog are declarative languages. They work like a simulation, where "the programmer sets conditions on the behavior of the program, but doesn't know what will happen once the program starts." (Rowe, 1988)

Like a simulator, the outcome of the program is not always known in advance, nor is the final output always correct.

This brings up an important difference between AI and conventional languages. Conventional programs produce definite answers to definite questions. An Ada program that computes square roots will always produce a correct answer, assuming no errors in the code. Conversely, a Lisp program that decides whether to grant a loan to a business may not always give a correct solution. Indeed, in some cases there may not even be a right answer.

B. WHY USE ARTIFICIAL INTELLIGENCE?

Artificial intelligence is used when traditional computer programming techniques fail. The problems addressed by AI are complex with complicated data. Often, no mathematical solution exists for the problem or, if one does exist, it is too elaborate to be efficiently implemented on a computer. Consequently, AI programs often are used when non-numeric solutions are sought.

Because analytic solutions are usually not available, most AI programs use heuristics when trying to solve a problem. Heuristics are general guidelines, rules-of-thumb, and common sense ideas that direct the search for a correct solution. As an example, consider the problem of finding lost car keys. One heuristic might be to look in the kitchen. This may or may not be a good idea, depending on when you were last in the kitchen. A better heuristic would be to look in the last room you visited. Still a better idea would be to check your pockets first and, if the keys are not there, look in the last room you visited. Obviously, some heuristics are more useful than others, some may actually

contradict each other, and none of them are guaranteed to produce results. AI programs handle heuristics adeptly and work well with problems that require them.

AI languages contain a rich set of features for treating information as an abstract object. The recently popular use of object oriented techniques (inheritance, encapsulation, polymorphism) in conventional programming languages has its roots in AI research. The use of frames, classes, and rules allows large amounts of data to be easily compared and modified. Consequently, artificial intelligence excels at problems involving pattern matching and finding similarities, differences, and trends in data.

Of the several AI concepts and tools available, the three principle ones used in this project are the expert systems, the neural network, and fuzzy logic.

C. EXPERT SYSTEMS

Expert systems are one of the more practical and commercially successful applications of artificial intelligence. An expert system "is a computer program that represents and reasons with knowledge of some specialized subject with a view to solving problems or giving advice." (Jackson, 1990, p. 3) The objective of an expert system is to capture in a computer program the knowledge and experience of an human authority. Once this knowledge has been encoded, the computer can be used to solve problems that previously required the skills of the human operator. One type of expert system attempts to replace the human expert with a machine. A well known example of this is Mycin, a program developed at Stanford in the 1970's to diagnose blood disorders. The program was quite successful as evidenced by a 1979 test in which the program actually out performed its human counterparts when recommending treatments (Jackson, 1990, p.

54). Other systems do not attempt to replace human experts, but instead work as an intelligent assistant that provides advice when asked. The Defense Advanced Research Project Agency (DARPA) is currently sponsoring work on Pilot's Assistant, an expert system for use in military jet aircraft to help make decisions when the pilot is disabled, distracted, or unable to interpret problems with his plane.

The key elements of an expert system are the problem domain, the knowledge base, and an inference engine. The problem domain is the input data that is provided to the expert system. It includes all the pertinent facts known about some problem over which the system has expertise. The knowledge base is a set of heuristics that can be used to find a solution to the problem. These heuristics take the form of rules that are used to guide the search. The inference engine does the actual work of finding a solution. Using one of several techniques, it applies the knowledge base to the problem domain until some sort of conclusion is reached. The problem domain represents facts about the problem, the knowledge base represents expertise that can help solve the problem, and the inference engine decides what knowledge to use on what facts and when to use it. Figure 19 shows the schematic for a typical expert system.

As an example, consider an expert system that helps choose an appropriate wine for dinner. Several factors must be considered, including the type of dish being served, the preferences of the individuals drinking the wine, and what wines are actually available. These concepts are stipulated in the following rules

```
IF the main dish has a sauce AND the sauce is sweet
THEN a sweet wine is recommended.

IF the main dish has meat in it AND it is a red meat
THEN recommend a red wine.

IF the dish is pasta
THEN recommend an Italian or French wine.

IF a red wine is recommended AND a sweet wine is recommended
THEN recommend pinot noir.

IF a red wine is recommended AND the guests do not like red wine
THEN recommend chardonnay.
```

These and other rules would constitute the knowledge base. A possible set of facts that could be given are

```
The main dish has red meat.
The main dish has a sweet sauce.
The guests prefer white wine.
```

Based on these rules and facts, the expert system would utilize it's inference engine to apply the facts to the knowledge and determine what to drink at dinner. Note that some

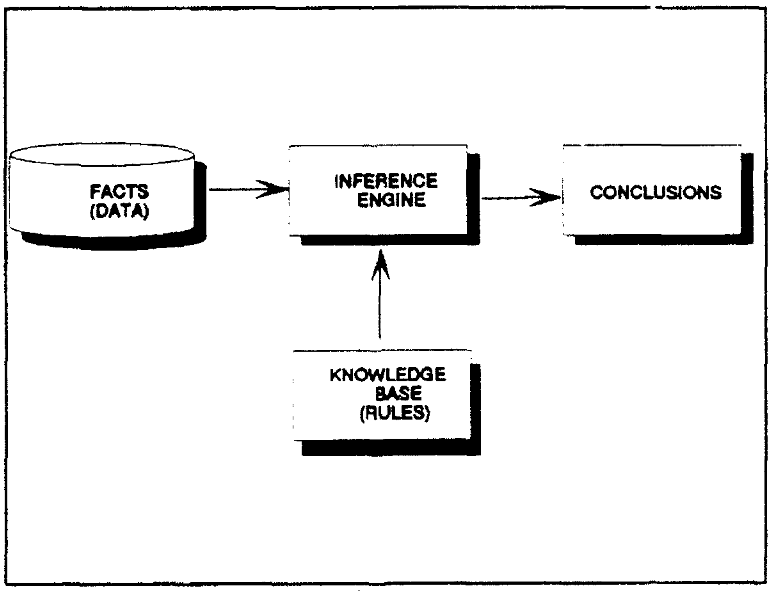


Figure 19. Typical Expert System

of the rules contradict each other and not all the facts are known for certain. The expert system will still reason despite these difficulties and, like the human counterpart, come up with a best solution based on what is known.

For obvious reasons, expert system are also called knowledge based systems. For less obvious reasons, they are also known as production systems. They form the basis for the research in this thesis.

D. ARTIFICIAL NEURAL NETWORKS

The brain is composed of neurons which interconnect through dendrils to form a network. This *natural* neural network is capable of complex pattern recognition, abstract reasoning, and learning. If the structure and mechanics of the neuron could be duplicated in an *artificial* neural network, then arguably some of the analytical power of the brain could be realized in an automata. This was the original motivation for research that today has evolved into the fields of massive parallel processing and neurocomputing. While practical neural networks have been built, there resemblance to natural neural networks is strictly topological; they lack the cognizance of a true brain and actually "incorporate features (that are) not neurobiologically possible." (Vemuri, 1988)

The architecture of neural networks involves layers of neurons. As shown in Figure 20, artificial neural networks are based on layers, with data being provided to an input layer and results produced at an output layer. Between the input and output are one or more hidden layers. Several schemes are used to interconnect the layers with Figure 20 showing the most common method of feed forward.

Figure 21 depicts an individual neuron. A unique weight is associated with each connection coming into a neuron and is used to scale each input. The total input, **I**, is the summation of all the weighted inputs and becomes the argument for the activation function, **a**. Biological neurons respond in a non-linear fashion to input and will not produce any output until some minimum threshold of stimulus is present. To mimic this behavior, artificial neurons can use non-linear activation functions with the sigmoid function being the most prevalent:

$$a(I) = \frac{1}{1+e^{-I \cdot Gain}}$$

Other possible functions include signum, tanh, and even simple linear relationships. Based on the activation function, a single output value is generated and passed along all the

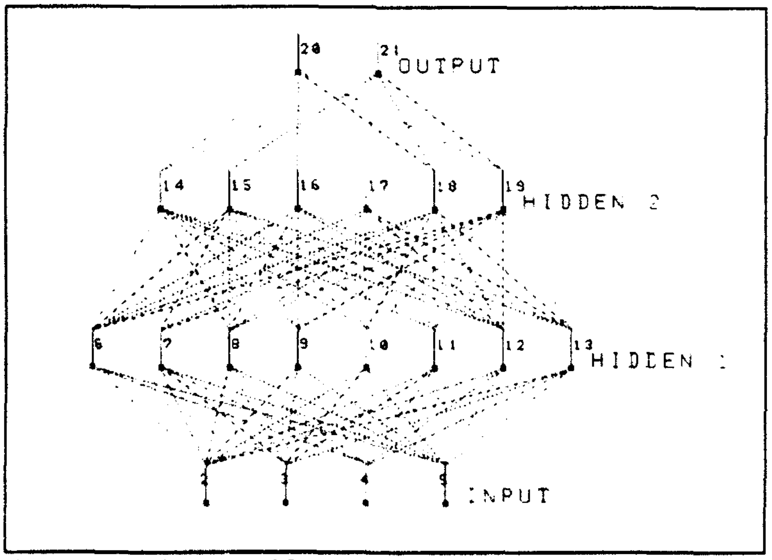


Figure 20. Example Neural Network

connections originating from the neuron. This output becomes part of the input to the next neural layer or, if there are no more layers, represents the final output of the entire system. Because of the activation function, artificial neural networks are non-linear and are theoretically capable of emulating any non-linear function.

As an example, two different architectures are presented in Figure 22 that solve the exclusive-or problem. This is a non-linear function since the output can not be represented by a simple linear combination of the input arguments. Weights are shown next to their respective connections. The numbers inside the individual neurons are a bias term that is added to the total input. Network **A** uses the standard sigmoid function for activation while **B** has an identity function. For **B**, the output is simply

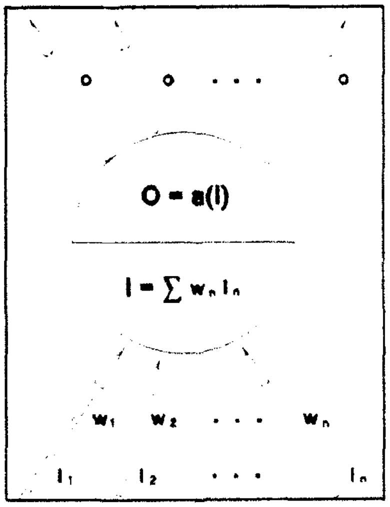
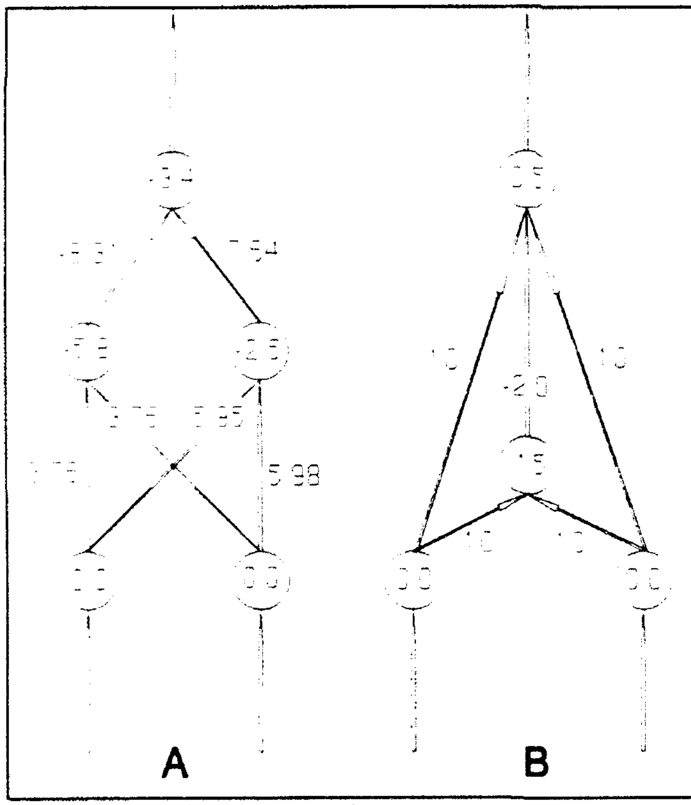


Figure 21. A Neuron

$$o_j = \sum_{j=1}^{n} i_j w_j + bias_j$$

Network **B** is more elegant and more accurate solution to the XOR problem than network **A** and highlights a problem with artificial neural nets. The efficiency of a network is a function of the number of nodes, the number of layers, and their interconnections. Unfortunately, there is currently little basis for deciding the type of topology to use for a given problem, so the selection of a structure, although crucial, is somewhat arbitrarily.

The knowledge possessed any network lies in the weights assigned to the connections between neurons. These weights must be either explicitly known and assigned



INPUT		OUTPUT A	OUTPUT B
0	0	0.05	0.00
0	1	0.95	1.00
1	0	0.95	1.00
1	1	0.05	0.00

Figure 22. XOR Neural Network

to each connection or, more practically, learned by the network. In most cases, learning is based on the back-propagation algorithm, also known as the delta rule. Initially, weights are set randomly. Using back-propagation, actual input arguments are fed up the network while desired output is fed down. Along the way the error between actual and desired output is propagated backwards and used to make differential corrections to the weights. The process of presenting actual input versus desired output is repeated until the weights converge to steady state values. At this point the network is said to be "trained" and is ready for use. Training can be a time consuming process, however it is accomplished off line and consequently does not effect the real time operation of the network.

Neural networks have their strong points when applied to the correct class of problems. As shown above, they can model non-linear functions. They degrade gracefully in the face of incomplete or contradictory input data, producing a best fit as output. They work well in problems requiring pattern matching, correlation, and associative memory. However, artificial neural networks do have limitations. The difficulties with selecting a topology have already been outlined. Additionally, the choice of training method is critical, but again little guidance exists on selecting one. Training algorithms require a large number of examples for input and output data which often are not available in real world problems. Finally, they suffer from local minima since training is based on hill-climbing. Consequently, there is no guarantee of achieving an optimal solution with an artificial neural network.

E. FUZZY LOGIC

An area of interest to the artificial intelligence community is reasoning under uncertainty, the drawing of conclusions from facts and relationships that are not definite. Uncertainty can arise both from data, which can be inaccurate or incomplete, and casual relations, which may be weak in that a given set of evidence does not always guarantee an anticipated conclusion. Humans can be skillful at reasoning under uncertainty and several mechanisms have been proposed to provide automata with similar capabilities. One of the first and most well known systems is probability theory which uses Bayes law along with frequency or judgmental probabilities to determine the belief in a hypothesis, H, given a body of evidence, E. Baysian probabilities have several drawbacks that other systems have tried to address. The Dempster-Shafer theory uses hypothesis sets and belief functions to prevent nonsupportive evidence from automatically weighing against a given hypothesis (Shafer, 1976). Alternately, the employment of certainty factors attempts to limit the number of probabilities that must be computed and reduce the complexity of obtaining them (Neapolitan, 1989).

A shortcoming of the probablistic approaches it that they do not truly emulate human reasoning. Experts rarely think in terms of probabilities, but instead use ambiguous propositions and a "pantheon of inexact intuitions, hunches, suspicions, beliefs, estimates, guesses, and the like" (Kosko, 1992, p. 3). Quantities are defined relative to one another, such as being "more", "less", or "about the same" while subjective terms like "rarely", and "sort of" are prevalent. To deal with this vagueness, fuzzy logic was developed.

Fuzziness is "a type of imprecision that stems from a grouping of elements into classes that do not have sharply defined boundaries" (Kandel, 1986, p. 2). Such classes arise when dealing with objects, data, and relationships that are imprecise and unclear, i.e., real world systems. The goal of fuzzy logic is to provide a mathematical basis for reasoning with these vague, nebulous descriptions and drawing useful conclusions in the face of uncertainties.

The foundation for fuzzy logic is Zadeh's work in fuzzy set theory (Zadeh, 1965). Orthodox set theory is binary, or crisp, requiring elements to be either a member of the set or not a member. Fuzzy membership is continuous, allowing elements to be full members, nonmembers, or partial members of a set. For a given a group of elements **X**, the fuzzy set **A** is defined as

$$A = \{ x, \ \mu_A(x) \} \qquad x \in X$$

$\mu_A(x)$ is termed "the grade of membership of x in A" and takes on a value from (0,1) to indicate a range from nonmembership to full membership. As an example, consider the group of tall people and the following heights:

$$X = \{4'6'', \ 5'0'', \ 5'6'', \ 6'0'', \ 6'6'', \ 7'0''\}$$

A traditional set would require some threshold, perhaps 6'0", and say any value above that threshold would be considered tall. The resulting set would then be

$$B = \{\ 6'0'',\ 6'6'',\ 7'0''\ \}$$

A fuzzy set would assign a subjective degree of membership to each element, resulting in a set composed of ordered pairs. Using fuzzy set notation, the results are

$$A = \{\ 5'0''/.2,\ 5'6''/.4,\ 6'0''/.8,\ 6'6''/.9,\ 7'0''/1.0\ \}$$

It is important to note that the degree of membership is not a probability. In the above example, the .8 associated with 6'0" does not mean that a person of height six feet has an eight in ten chance of being tall. Nor does it imply that 80% of the tall people are 6'0". Rather, it indicates that six feet conforms well with most people's idea of what defines tall. Relatively speaking, it conforms better than 5'6" but not as well as 6'6".

Central to fuzzy sets is the membership function, $\mu_A(\mathbf{x})$, which maps the elements from **X** into the fuzzy set. Membership functions can be discrete or continuous, linear or nonlinear. They are subjective and usually a mathematical formula can be developed to describe them. As another example, consider the problem of grouping points in euclidean space. Given a point, **a**, it is desirable to find the set of points, **b**, that are close to **a**. One membership function that might be used is

$$\mu_A(d) = \frac{1}{e^d}$$

where

$$d = [\,(x_a - x_b)^2 + (y_a - y_b)^2 + (z_a - z_b)^2\,]^{\frac{1}{2}}$$

Such a function is both continuous and nonlinear. The exact form taken by the membership function is dependent on both the elements to be mapped and the problem

$$A \cup B = \textit{set union}$$
$$= \min[\mu_A(x),\ \mu_B(x)]$$

$$A \cap B = \textit{set intersection}$$
$$= \max[\mu_A(x),\ \mu_B(x)]$$

being addressed.

Fuzzy set operators have been defined as

The mathematical justification for the minimum and maximum functions is provided by (Bellman and Giertz, 1973). In addition, a body of theory known as possibility theory has been developed to support reasoning using fuzzy sets.

Fuzzy logic provides a technique for representing imprecise knowledge and retains information that might be lost in a crisp representation. Some argue that fuzzy logic is simply a form of probability theory, an idea which may be true. However, when dealing with vagueness, fuzzy logic can provide a more natural method for emulating human reasoning than is currently realizable from Baysian methods.

APPENDIX B. BASICS OF ORBITAL MECHANICS

What follows is a primer of concepts and terminology used in the field of orbital mechanics. It provides a brief overview with more detailed information available in the references.

A. EQUATIONS OF MOTION

The motion of heavenly bodies in orbit is quite predictable. First observed empirically by Kepler in 1609, it was not until Newton's development of calculus that the governing equations of motion were available. Like any physical body, satellite motion is governed by three principles: the equations of motion, the conservation of angular momentum, and the conservation of energy. The resulting equations determine the shape of an orbit and a satellite's motion in that orbit.

1. Equations Of Motion

According to Newton, **F** = m**a**. For a satellite in orbit, this becomes

$$\begin{aligned} \vec{F} &= \vec{F}_g + \vec{F}_p \\ &= m\vec{a} \\ &= m\vec{r}'' \end{aligned}$$

where
$\vec{F}_g$: *gravitational forces*
$\vec{F}_p$: *pertubation forces*
$\vec{r}$: *distance between the two bodies*
M, m: *mass of each body*

The perturbation forces are the total of all non-gravitational forces acting on the body. Assuming they are negligible, motion is defined by

$$\vec{F} = \frac{GMm}{r^2}\frac{\vec{r}}{r}$$

where
G: universal gravitational constant

Several simplifying assumptions were made to achieve the above results. Specifically.

- Only two bodies are involved, influencing each other's motion
- Gravity is inversely proportional to distance
- The bodies are spherical and can be represented by a point mass
- Motion is measured in a Newtonian reference frame

In the case of no perturbation forces and substituting μ=GM, the equation becomes

$$\vec{r}'' + (\mu/r^3)\,\vec{r} = 0$$

2. Conservaton Of Angular Momentum

Just as linear momentum is constant in the absence of external forces, angular momentum is constant in the absence of external torques. For the specific case of a satellite, this becomes

$$\frac{d\vec{h}}{dt} = \frac{d(\vec{r} \times \vec{v})}{dt}$$

$$= 0$$

h: angular momentum
v: instantaneous velocity of satellite

3. Conservation Of Energy

Gravity fields are conservative such that "an object moving under the influence of gravity alone does not lose or gain mechanical energy, but only exchanges one form of energy, kinetic, for another form, potential." (Bate 1971) The motion of a satellite in orbit can be viewed as a continuous trade off of these two energies. When far from Earth, the object has much potential energy but little kinetic, so the resulting speed is low at that point in the orbit. As the satellite falls back down into gravity's well it accelerates, trading potential energy for kinetic and increasing its speed in the process. Always the total energy is constant. In mathematical terms

$$\xi = \frac{v^2}{2} - \frac{\mu}{r}$$

ξ: *specific energy (energy per unit mass)*

B. TYPES OF ORBITS

The simultaneous solution to the above three equations describes the orbital path of the satellite. The family of solutions is known collectively as the conic sections and the actual orbit must be a circle, an ellipse, a hyperbola, or a parabola. Examples of each are given below in Figure 23. The distance marked **a** is the semi-major axis, while **b** is the semi-minor axis. **p** is the semi-iatus rectum. The eccentricity is **e**, and is equal to c/**a**.

What type of orbit a satellite assumes is dependent solely on the specific energy, ξ. The eccentricity is dependent on both the specific energy and the angular momentum of the satellite.

Objects in parabolic or hyperbolic orbits are aperiodic and are literally lost in space.

Of more interest to Earth orbiting objects are the circular and elliptical trajectories, shown in figure 24.

For circular and elliptical orbits, the period or time to complete one orbit is given by

$$\tau = \frac{2\pi a^{\frac{2}{3}}}{\sqrt{\mu}}$$

In the case of a circular orbit, **a** is simply the radius of the circle. Also for the circular orbit, the constant magnitude of the velocity is

$$v = \sqrt{\frac{\mu}{a}}$$

No simple expression exists for the velocity of an elliptical orbit since it varies as a function of position in the ellipse. Indeed, a closed form solution for position and velocity in an elliptical orbit does not exist, requiring iterative techniques to be used.

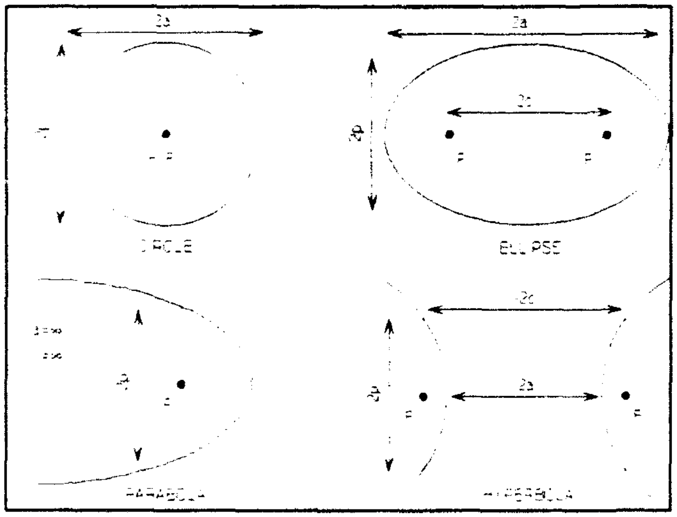


Figure 23. Conic Sections

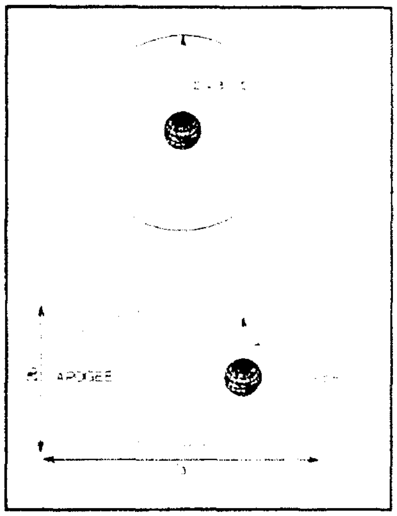


Figure 24. Earth Orbits

C. ORBITAL ELEMENTS

The parameters **a**, **b**, **p**, and **e** can be used to describe the shape of an orbit. To completely specify the position of a satellite, it is necessary to also know the orientation of the orbit relative to Earth and the position of the satellite in that orbit. This requires some sort of frame of reference of which several have been devised.

1. Coordinate Systems

One of the subtleties of the equations of motion is that they require an observer to be in a Newtonian, or inertially fixed, reference frame. An observer sitting on the surface of the Earth is not in not inertially fixed, since that person is spinning with the planet. Terrestrial latitude and longitude, although important for recording observations of celestial bodies, are useless for defining the position and motion of a satellite. Several alternate coordinate systems have been proposed, one of which is the geocentric inertial shown in Figure 25. Two axis of the system lie in the plane defined by

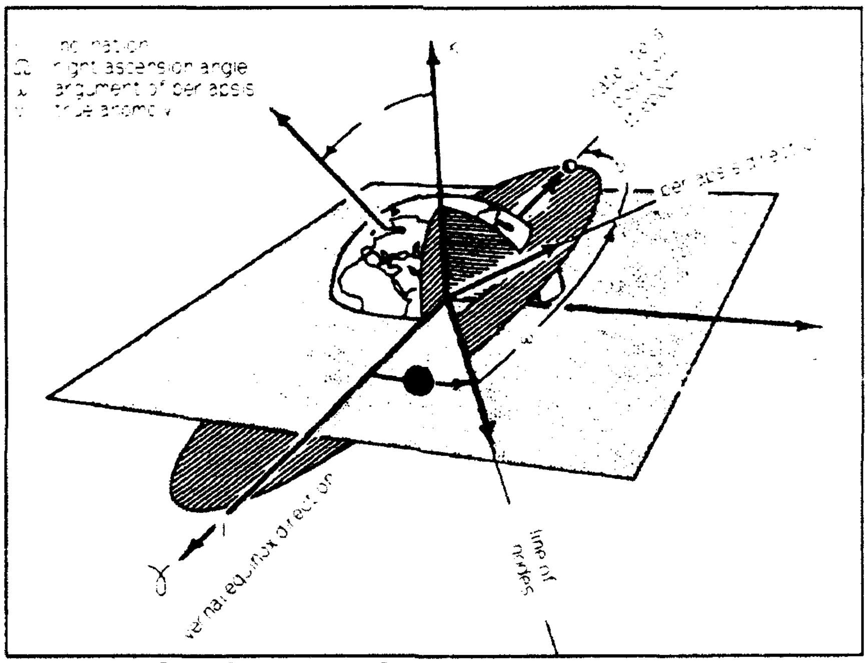


Figure 25. GCI Coordinate System

the Earth's equator with one of the axis pointing at the constellation Aries. The third axis is perpendicular and points to the north celestial pole. Origin is at the center of the Earth. The position of an object is given by its right ascension angle, Ω, and declination, δ. Declination is also known as inclination, **i**.

2. Classical Elements

A complete description of an heavenly bodies position and orbit is given by its orbital elements. Figure 25 outlines these elements. The shape of the orbit is given by **a** and **e**. Alternately, **a** can be replaced by the period since their relationship is mathematically fixed. The orientation of the orbit relative to Earth is given by Ω, right ascension, and ω, called the argument of periapsis. Finally, the position of the satellite is υ, the true anomaly or epoch. True anomaly may also be given as a time past some point in the orbit, such as how many minutes the satellite is beyond the perigee point. Based on these six elements, the position and motion of satellites is cataloged.

APPENDIX C. NAVSPASUR SID PRINTOUT

This appendix contains the printout produced by NAVSPASUR's SID program. It matches unknown and uncorrelated tracks to every satellite and computes the resulting ΔU, ΔV, and ΔW errors. It is the fundamental tool used to select tracks for manual fitting to the orbital database.

The first line lists the satellite that the program is currently matching to the observations. From left to right, the data fields are the NAVSPASUR catalog number, the inclination, the period, the decay rate, the international designation for the satellite, the right ascension angle, and the epoch of the element set. Units for each field are given in Table VI along with some sample values. Following the satellite data is one or more lines of observation data with units shown in Table VII. The epoch, both date and time.

TABLE VI. SATELLITE DATA

PARAMETER	UNITS	VALUE
INTERNATIONAL DESIGNATION	N/A	88 098 C
CATALOG NUMBER	N/A	20132
DECLINATION	DEGREES	4.07
PERIOD	MINUTES	440.34
RIGHT ASCENSION	DEGREES	333.63
DECAY RATE	MIN/DAY	-0.1590
ECCENTRICITY	N/A	0.00
EPOCH OF THE ELEMENT SET	YYMMDD	911222

is provided along with the measured altitude of the observed object. The next three columns are the cartesian errors that resulted in attempting to fit this particular observation to the satellite's current orbit. The NAVSPASUR programs utilize a least mean square algorithm for curve fitting and the resulting errors are presented in the orbital reference frame. Consequently, the columns give the ΔU, ΔV, and ΔW for the particular observation. The numbers listed are not actual distances, rather they are based on the partial derivatives of the observation with respect to the satellite's element set. As such they have no units.

The final two columns in the rows of observation data are the sensor tag which is the original satellite correlated with this observation by the sensor and the sensor's identification number.

This data was collected on 12 February 1992.

TABLE VII. OBSERVATION DATA FROM SID

PARAMETER	UNITS	VALUE
EPOCH OF OBSERVATION	YYMMDD HHMMSS.HH	911222 000549.26
ALTITUDE	NM	1129
ΔU	N/A	-6
ΔV	N/A	-1
ΔW	N/A	-8
SENSOR TAG	N/A	90335
SENSOR	N/A	382

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH		
	DATE	TIME	ALT	ΔU	ΔV	ΔW	TAG	SENSOR
11	32.87	122.86	-.0018	59 ALP 1	60.13	920211		
	920209	120409.88	1410.	420.	-861.	11.	15390	398
	920114	202056.60	875.	-370.	-2129.	-21.	21692	398
	920114	202122.58	834.	-415.	-2099.	-10.	21692	398
	920211	120320.58	1492.	179.	1815.	-12.	83999	222
	920211	120406.11	1432.	160.	1625.	17.	83999	222
12	32.90	127.18	-.0018	59 ALP 2	273.96	920211		
	920131	192541.67	454.	105.	149.	13.	19881	398
22	50.30	98.74	-.0008	59 IOT 1	229.16	920211		
	920211	000827.75	304.	-266.	924.	2.	90000	329
45	66.70	100.88	-.0003	60 ETA 1	191.08	920211		
	920211	224415.30	473.	-348.	-1486.	13.	95291	393
58	28.33	106.99	-.0000	66 NU 1	46.55	920211		
	920206	050941.81	636.	108.	-151.	13.	15390	398
115	48.17	98.47	-.0008	60 BET 4	345.50	920211		
	920211	144034.02	351.	-38.	54.	9.	83999	221
	920211	144053.94	385.	-3.	6.	6.	83999	221
133	67.14	102.41	-.0003	61 OMI 18	322.36	920211		
	920211	092159.30	427.	-68.	-69.	15.	89376	232
152	66.60	102.66	-.0001	61 OMI 37	26.55	920211		
	920211	061207.43	489.	30.	360.	-4.	93915	396
155	66.89	101.65	-.0009	61 OMI 40	161.78	920211		
	920211	183000.53	406.	-86.	-706.	19.	95201	393
166	47.96	91.35	-.0526	61 RHO 3	176.15	920211		
	920202	124852.63	171.	-354.	1489.	5.	88072	398
179	66.87	100.61	-.0073	61 OMI 52	236.43	920211		
	920211	043719.26	444.	-173.	-1169.	-14.	86777	329
196	91.17	161.87	-.0000	61 SIG 4	2.06	920211		
	920112	212622.32	1923.	-119.	1541.	23.	21538	398
	920115	003744.03	1954.	-476.	2504.	-5.	21538	745
223	66.89	103.79	-.0001	61 OMI 58	105.67	920211		
	920211	100130.79	493.	-191.	-1090.	-4.	93938	396
229	48.29	97.60	-.0026	62 BET 4	23.22	920211		
	920208	094403.72	384.	48.	166.	10.	15390	398
235	66.96	102.78	-.0002	61 OMI 66	188.17	920211		
	920211	220213.80	500.	-168.	-1098.	7.	95293	393
263	66.54	101.06	-.0010	61 OMI 82	326.59	920211		
	920211	053140.08	362.	-172.	-587.	-5.	18955	399
324	66.87	102.74	-.0003	61 OMI 97	111.32	920211		
	920213	100130.79	493.	-169.	3128.	-11.	93938	396
341	44.79	157.55	-.0000	62 A-E 2	217.62	920211		
	920207	120727.41	1207.	-215.	917.	22.	15390	398
	920211	003053.61	596.	-176.	1405.	-33.	90000	329
388	98.56	95.57	-.0056	62 A-O 4	191.39	920211		
	920210	223052.30	330.	32.	-90.	2.	89405	242

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
447	50.13	107.57	-.0000	62 B-M 2	75.06	920211		
	920211	122649.15	589.	-217.	-1348.	-3.	86680	329
548	66.69	99.74	-.0007	61 OMI 176	98.44	920211		
	920211	031815.68	483.	-77.	-884.	15.	94687	399
558	65.70	112.23	-.0001	61 OMI 183	231.68	920211		
	920211	113747.66	932.	-175.	1973.	13.	94719	399
560	67.17	108.44	-.0008	61 OMI 185	34.34	920211		
	920211	104520.79	706.	69.	1011.	-1.	94258	399
	920211	104534.61	525.	-40.	657.	-13.	94257	399
649	66.27	114.13	-.0001	61 OMI 193	147.85	920209		
	920211	050733.42	936.	-289.	-1643.	-9.	94698	399
655	67.26	110.64	-.0002	61 OMI 199	326.06	920211		
	920211	091049.88	739.	102.	124.	-13.	89376	232
658	65.88	108.66	-.0003	61 OMI 202	216.29	920211		
	920211	122504.49	600.	-184.	877.	6.	93957	396
	920211	122514.36	601.	-186.	883.	-20.	93957	396
700	30.48	107.95	-.0002	63 047 F	39.68	920211		
	920211	080552.99	397.	-57.	-276.	2.	94707	399
702	87.33	166.36	.0000	63 014 H	307.69	920211		
	920211	103545.78	1807.	-48.	253.	-26.	89832	231
	920211	103614.94	1818.	-32.	156.	-20.	89832	231
	920211	103641.84	1830.	-17.	66.	-15.	89832	231
	920211	103708.06	1844.	-2.	-21.	-11.	89832	231
	920211	103754.13	1874.	26.	-175.	-7.	89832	231
	920211	103822.07	1895.	44.	-269.	-6.	89832	231
	920211	103934.11	1958.	91.	-514.	-7.	89832	231
	920211	103954.72	1979.	106.	-585.	-8.	89832	231
	920211	104037.63	2025.	135.	-734.	-12.	89832	231
	920211	104059.94	2050.	150.	-812.	-15.	89832	231
	920211	104125.83	2081.	168.	-903.	-19.	89832	231
	920211	104155.42	2119.	188.	-1009.	-23.	89832	231
720	58.46	100.14	-.0002	63 054 C	253.13	920211		
	920211	205718.99	459.	-25.	-527.	-19.	94000	396
738	46.41	194.78	-.0000	64 003 B	16.81	920211		
	920210	225629.64	4194.	-379.	-2862.	-9.	89415	242
	920210	225706.13	4216.	-395.	-2945.	6.	89415	242
	920210	225738.49	4235.	-410.	-3019.	19.	89415	242
739	30.43	104.80	-.0005	63 047 H	37.37	920211		
	920211	051429.24	534.	173.	-149.	-12.	89810	232
	920211	085524.11	490.	-98.	-671.	-17.	89336	232
	920211	085601.02	526.	-104.	-834.	15.	89336	232
750	60.83	140.87	-.0093	64 006 C	198.00	920211		
	920210	230244.97	2090.	48.	2539.	-0.	89413	242
	920210	230314.40	2054.	43.	2419.	-14.	89413	242
956	89.77	105.77	-.0002	64 083 B	320.48	920211		
	920207	161921.30	569.	-158.	-1210.	-0.	21538	384
967	89.77	105.78	-.0002	64 083 F	320.63	920231		
	920207	161921.30	569.	-64.	815.	7.	21538	384

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH		
	DATE	TIME	ALT	ΔU	ΔV	ΔW	TAG	SENSOR
979	96.42	118.80	-.0003	65 004 B	12.37	920211		
	920211	182608.23	406.	-49.	-539.	-5.	95201	393
1271	70.08	103.27	-.0001	65 016 A	213.40	920211		
	920211	224415.30	473.	-16.	58.	6.	95291	393
1272	70.08	103.36	-.0000	65 016 H	229.34	920211		
	920211	220213.80	500.	-171.	1187.	-8.	95283	393
1312	96.34	117.57	-.0002	65 004 C	74.35	920211		
	920210	235934.85	1124.	-133.	2251.	15.	93877	396
	920211	015337.55	473.	-149.	-575.	-6.	94682	399
1347	56.01	102.21	-.0061	65 020 S	77.25	920211		
	920211	123854.69	268.	-174.	437.	4.	94721	399
1370	56.07	102.62	-.0038	65 020 AC	67.33	920211		
	920211	025141.64	465.	115.	-682.	-5.	93690	399
1377	98.15	97.34	-.0019	65 038 A	100.15	920211		
	920211	081032.68	400.	-86.	1265.	5.	90000	329
1477	55.51	111.91	-.0008	65 020 BB	271.46	920211		
	920205	025953.06	770.	-264.	2108.	-2.	15390	398
1576	34.23	127.07	-.0047	58 BET 3	237.30	920211		
	920205	025047.47	1640.	214.	2010.	-14.	15390	398
1583	98.55	100.26	-.0005	65 072 D	304.11	920211		
	920211	145023.30	360.	-72.	-838.	10.	94157	393
1588	56.06	116.65	.0000	65 073 E	53.32	920211		
	920211	074256.45	878.	-418.	-2043.	-2.	93925	396
1589	56.05	110.80	-.0000	65 073 F	122.67	920211		
	920211	174633.88	897.	-26.	367.	-3.	89415	241
	920211	174634.25	897.	-26.	358.	9.	89417	242
	920211	174701.55	890.	-26.	266.	-11.	89415	241
	920211	174711.38	889.	-25.	224.	-2.	89417	242
	920211	174726.68	890.	-21.	177.	-17.	89415	241
	920211	174738.50	892.	-17.	128.	-8.	89417	242
	920211	174808.02	905.	-2.	25.	-14.	89417	242
1613	144.24	118.03	-.0020	65 078 A	312.73	920211		
	920207	072845.71	165.	-216.	499.	10.	15390	398
1716	32.19	99.58	-.0002	65 082 BX	104.96	920211		
	920210	201818.77	398.	15.	7.	10.	82080	222
1778	34.26	107.53	-.0002	65 096 A	304.46	920212		
	920127	005053.62	235.	-257.	-1137.	6.	88048	398
1806	79.82	120.10	-.0004	65 098 B	136.03	920211		
	920211	064921.49	626.	152.	843.	-13.	93919	396
	920211	064931.36	627.	158.	836.	-21.	93919	396
	920211	065634.61	357.	49.	-473.	21.	18955	396
	920211	065644.48	357.	39.	-557.	19.	18955	396
1808	79.80	106.11	-.0077	65 098 D	138.06	920211		
	920211	061511.19	566.	101.	-1110.	-10.	93915	390
	920211	171401.23	552.	102.	880.	14.	94742	399
1843	65.00	95.31	-.0020	65 106 A	162.61	920211		

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH		
	DATE	TIME	ALT	ΔU	ΔV	ΔW	TAG	SENSOR
	920211	212305.36	286.	-63.	-694.	5.	90000	329
1864	89.67	104.69	-.0001	65 109 A	19.52	920211		
	920210	230710.23	575.	-1.	-5.	-8.	89413	242
	920210	230740.94	560.	-18.	-122.	1.	89413	242
1959	31.79	99.43	-.0004	65 062 00	354.81	920211		
	920211	052011.96	441.	35.	361.	-4.	89324	232
2092	79.87	118.69	-.0012	65 098 H	89.82	920211		
	920206	145927.72	876.	-36.	965.	-21.	88079	398
2153	79.76	118.36	-.0007	65 098 J	.40	920211		
	920211	075717.88	279.	-302.	-259.	1.	90434	385
2167	82.37	112.74	-.0128	68 034 B	121.23	920211		
	920211	091049.88	385.	-49.	1308.	-3.	89376	232
	920211	091113.51	329	-49.	1121.	8.	89376	232
	920211	091134.08	283	-55.	960.	17.	89376	232
2177	98.90	100.17	-.0004	66 026 0	13.55	920211		
	920210	205651.27	306.	-227.	-475.	-9.	19994	399
2215	11.63	1334.48	0.0000	66 053 B	354.72	920204		
	920211	084751.73	18292.	72.	733.	2.	89832	232
	920211	084813.75	18293.	72.	739.	-3.	89832	232
	920211	084836.37	18293.	73.	744.	-9.	89832	232
	920211	084857.67	18294.	73.	749.	-14.	89832	232
2222	12.11	1349.35	0.0000	66 053 J	356.17	920209		
	920211	083534.22	18614.	97.	1045.	18.	90006	232
	920211	083818.91	18623.	99.	1094.	-23.	89832	232
	920211	083843.59	18624.	99.	1101.	-30.	89832	232
	920211	083904.72	18625.	100.	1107.	-35.	89832	232
	920211	083927.32	18626.	100.	1114.	-41.	89832	232
2226	89.05	106.87	-.0002	65 109 D	50.36	920211		
	920211	195801.70	598.	-186.	988.	17.	86698	329
2337	144.23	105.11	-.0001	65 063 E	247.16	920211		
	920211	094315.63	560.	-190.	-1295.	-14.	89370	232
2353	89.39	104.98	-.0002	65 109 2	85.38	920211		
	920211	224222.40	473.	-67.	714.	-20.	95291	393
2361	87.29	166.26	.0001	63 014 L	300.84	920211		
	920211	175147.94	2194.	324.	1276.	7.	89416	242
2362	86.49	165.15	.0003	63 014 M	177.32	920211		
	920209	183745.81	1720.	-501.	-256.	-3.	21538	396
2367	86.07	164.27	-.0001	63 014 S	74.28	920211		
	920206	143035.10	2210.	291.	-1332.	6.	15390	398
2435	100.92	114.58	-.0000	66 087 A	237.96	920211		
	920211	113545.63	751.	-353.	1670.	11.	94719	399
2481	90.05	167.59	.0000	66 089 A	126.41	920211		
	920213	103954.72	2035.	24.	75.	-23.	89832	231
2531	86.98	165.53	-.0008	63 014 AK	315.76	920210		
	920211	085949.03	2058.	-258.	1140.	-27.	90000	951
	920211	090003.68	2056.	-251.	1094.	-22.	90000	951

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH		
	DATE	TIME	ALT	ΔU	ΔV	ΔW	TAG	SENSOR
	920211	090018.48	2054.	-244.	1347.	-16.	90000	951
2639	13.83	1436.38	0.0000	67 001 A	15.63	920208		
	920211	083818.91	19217.	-90.	-718.	35.	89832	232
	920211	083843.59	19218.	-89.	-709.	25.	89832	232
	920211	083904.72	19218.	-88.	-701.	16.	89832	232
	920211	083927.32	19219.	-87.	-[illegible]93.	6.	89832	232
	920211	084013.83	19221.	-85.	-677.	-14.	89832	232
	920211	084039.55	19221.	-84.	-667.	-25.	89832	232
	920211	084103.66	19222.	-83.	-659.	-35.	89832	232
	920211	084126.91	19223.	-82.	-650.	-45.	89832	232
2685	38.95	105.40	-.0023	67 014 F	349.47	920211		
	920123	042117.61	695.	216.	-1010.	-17.	88893	398
2702	88.58	108.02	-.0002	66 076 D	213.96	920211		
	920210	094148.35	603.	-182.	1059.	8.	15390	398
2777	90.27	103.34	-.0006	67 034 C	223.55	920211		
	920208	120646.15	454.	-114.	865.	-8.	21538	398
2865	10.50	1313.60	0.0000	67 066 D	34.62	920210		
	920211	041558.43	17889.	17.	40.	21.	2865	369
	920211	041645.61	17890.	17.	44.	26.	2865	369
	920211	042132.33	17892.	19.	49.	30.	2865	369
	920211	042255.56	17892.	19.	49.	29.	2865	369
	920211	042419.82	17892.	18.	55.	16.	2865	369
	920211	042543.79	17892.	19.	54.	21.	2865	369
	920211	042708.80	17893.	19.	57.	23.	2865	369
	920211	042832.11	17896.	22.	67.	38.	2865	369
	920211	042956.39	17897.	23.	66.	46.	2865	369
	920211	043121.74	17896.	22.	62.	45.	2865	369
	920211	043244.79	17896.	22.	60.	47.	2865	369
	920211	043409.22	17895.	21.	53.	43.	2865	369
	920211	043532.58	17895.	20.	47.	47.	2865	369
	920211	043656.04	17893.	18.	36.	38.	2865	369
	920211	043819.40	17894.	19.	37.	38.	2865	369
	920211	043942.48	17894.	18.	38.	30.	2865	369
	920211	044106.02	17894.	18.	39.	30.	2865	369
	920211	044229.97	17895.	19.	38.	35.	2865	369
2868	10.64	1319.09	0.0000	67 066 G	34.70	920210		
	920211	041558.43	17889.	-1789.	-8260.	-8.	2865	369
	920211	041845.61	17890.	-1787.	-8254.	-4.	2865	369
	920211	042132.33	17892.	-1783.	-8247.	-0.	2865	369
	920211	042255.56	17892.	-1783.	-8245.	-2.	2865	369
	920211	042419.82	17892.	-1781.	-8238.	-15.	2865	369
	920211	042543.79	17892.	-1781.	-8238.	-11.	2865	369
	920211	042708.80	17893.	-1779.	-8234.	-9.	2865	369
	920211	042832.11	17896.	-1772.	-8224.	6.	2865	369
	920211	042956.39	17897.	-1772.	-8224.	13.	2865	369
	920211	043121.74	17896.	-1774.	-8225.	12.	2865	369
	920211	043244.79	17896.	-1774.	-8225.	14.	2865	369
	920211	043409.22	17895.	-1778.	-8230.	10.	2865	369
	920211	043532.58	17895.	-1781.	-8234.	14.	2865	369
	920211	043656.04	17893.	-1786.	-8241.	4.	2865	369
	920211	043819.40	17894.	-1785.	-8239.	3.	2865	369
	920211	043942.48	17894.	-1785.	-8237.	-4.	2865	369
	920211	044106.02	17894.	-1784.	-8234.	-5.	2865	369
	920211	044229.97	17895.	-1784.	-8234.	-0.	2865	369
2976	302.11	112.36	-.0000	67 036 C	121.32	920211		
	920211	035954.40	706.	-126.	993.	10.	19185	396

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH		
	DATE	TIME	ALT	ΔU	ΔV	ΔW	TAG	SENSOR
	920211	041012.56	705.	-233.	-1287.	11.	93902	396
	920211	041032.30	704.	-236.	-1291.	-17.	93902	396
2997	80.13	364.41	-.0002	63 014 AU	36.30	920211		
	920210	210416.94	1656.	-18.	724.	-11.	89207	221
3093	105.79	112.21	.0001	68 002 A	123.08	920211		
	920211	083930.42	609.	-262.	708.	1.	90000	329
3094	105.79	112.10	-.0000	68 002 B	147.63	920211		
	920231	051618.88	792.	-94.	-1037.	-18.	94699	399
3173	99.97	198.84	-.0004	68 026 A	310.33	920211		
	920211	122819.47	113.	-376.	-670.	-23.	94133	393
3174	100.00	207.21	-.0003	68 026 B	149.88	920211		
	920211	144012.71	3853.	375.	1256.	18.	83999	221
	920211	144034.02	3849.	357.	1195.	7.	83999	221
	920211	144053.94	3845.	340.	1138.	-2.	83999	221
	920211	144114.03	3842.	323.	1081.	-12.	83999	221
3267	88.38	127.60	-.0004	63 014 CF	67.85	920211		
	920205	121901.77	1863.	362.	-1755.	-13.	15390	398
3292	12.38	1363.68	0.0000	68 050 J	.03	920211		
	920211	083534.22	18369.	-286.	-1873.	15.	90000	232
	920211	083818.91	18369.	-277.	-1824.	-31.	89832	232
	920211	083843.59	18369.	-276.	-1817.	-38.	89832	232
	920211	083904.72	18369.	-275.	-1810.	-43.	89832	232
	920211	083927.32	18369.	-274.	-1804.	-50.	89832	232
3343	80.54	104.02	-.0142	68 066 E	59.35	920211		
	920211	111025.10	353.	-174.	546.	15.	94716	399
	920211	111646.93	644.	52.	-487.	11.	94717	399
3432	11.88	1419.24	0.0000	68 081 E	21.77	920209		
	920211	091752.36	19458.	99.	4201.	-38.	89832	232
	920211	091818.53	19458.	98.	4209.	49.	89832	232
3462	32.03	97.49	-.0007	65 062 PT	333.92	920211		
	920211	074001.84	370.	37.	-87.	-8.	89324	232
3492	30.48	99.79	-.0064	65 082 QN	24.47	920211		
	920211	083244.24	457.	171.	179.	-17.	89336	232
3509	62.38	105.64	-.0031	68 091 F	235.31	920211		
	920121	101515.05	617.	-262.	1447.	-15.	3899	329
3551	62.30	108.19	-.0029	68 097 D	287.86	920211		
	920211	184313.72	551.	253.	115.	2	93983	396
3553	62.27	104.06	-.0095	68 097 F	215.16	920231		
	920211	195236.22	756.	-245.	2198.	-10.	19111	396
3555	62.32	110.74	-.0001	68 097 H	223.80	920211		
	920122	023456.12	346.	-399.	1451.	-8.	87302	396
	920211	002701.70	261.	-369.	1487.	17.	86651	329
	920211	003102.63	453.	81.	157.	-9.	90000	329
	920211	111558.36	638.	195.	870.	-17.	94717	399
3558	62.21	104.32	-.0025	68 097 L	203.45	920211		
	920211	201457.39	359.	-350.	-913.	11.	86762	329

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
3560	62.28	101.80	-.0117	68 097 N	239.99	920211		
	920211	135429.55	448.	-112.	-199.	11.	80069	399
3569	62.32	107.92	-.0040	68 097 V	306.08	920211		
	920211	075205.23	701.	155.	264.	5.	89376	232
	920211	075226.91	667.	117.	183.	-10.	89376	232
3592	90.09	106.12	-.0002	65 048 F	254.85	920211		
	920211	122444.75	600.	37.	-312.	13.	93957	396
3670	88.41	126.78	-.0001	69 009 B	84.61	920211		
	920208	132630.42	746.	369.	-258.	18.	88079	398
3681	62.12	95.16	-.0275	68 091 AG	56.51	920211		
	920211	061501.05	283.	-19.	-128.	-16.	87329	396
3699	62.33	105.10	-.0063	68 091 AN	29.65	920211		
	920211	131148.50	254.	-202.	-562.	17.	94145	393
3713	62.22	112.73	-.0018	68 097 AQ	216.31	920211		
	920211	100951.00	685.	-226.	1645.	-14.	94714	399
3741	29.90	104.09	-.0016	63 047 L	70.23	920211		
	920211	011447.48	483.	-213.	522.	18.	94679	399
3748	67.75	112.97	-.0005	61 OMI 220	309.31	920211		
	920211	041004.20	500.	-400.	446.	3.	5599	399
	920211	095328.07	940.	10.	-374.	-10.	89832	232
	920211	095352.86	960.	18.	-466.	4.	89832	232
	920211	095416.79	982.	27.	-556.	-3.	89832	232
3749	56.14	107.42	-.0017	65 020 EU	275.84	920211		
	920131	052028.33	445.	105.	159.	6.	88788	398
	920211	040254.32	679.	57.	203.	-4.	86778	329
3758	62.26	113.96	-.0010	68 091 AV	65.13	920211		
	920211	144256.24	977.	-327.	1313.	2.	90236	383
3783	62.40	103.29	-.0046	68 097 AV	265.03	920211		
	920211	051401.39	587.	-86.	115.	17.	89810	232
3784	62.24	111.22	-.0020	68 097 AW	74.94	920211		
	920211	153935.33	458.	-41.	-864.	-5.	86767	329
	920211	121422.99	537.	-249.	-910.	3.	93329	399
3790	63.01	109.73	-.0019	68 091 AX	349.27	920211		
	920203	220536.85	296.	-292.	884.	-13.	19994	399
	920204	215632.71	299.	-263.	-94.	-16.	19994	399
3794	62.27	112.17	-.0013	68 091 BB	134.75	920211		
	920211	100004.44	588.	-10.	220.	-5.	93937	396
3811	101.98	112.86	.0000	68 114 C	265.80	920211		
	920211	191315.07	780.	-33.	-787.	-10.	95222	393
3818	73.99	106.29	.0000	69 024 A	76.67	920211		
	920205	130741.94	649.	6.	236.	-10.	88079	398
3825	104.74	151.60	-.0007	69 025 C	106.01	920211		
	920211	091818.53	2651.	6.	820.	6.	89832	232
	920231	091839.88	2637.	12.	754.	-10.	89832	232
3843	62.27	113.30	-.0023	68 097 BG	34.73	920211		

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
	920211	085915.18	1074.	-141.	1218.	-6.	94711	399
3874	62.28	112.47	-.0009	68 091 BH	210.28	920209		
	920211	102022.85	695.	-301.	2120.	-0.	94491	399
3899	62.22	105.60	-.0026	68 097 BL	64.42	920112		
	920116	052633.12	700.	-87.	-344.	4.	3899	396
	920121	101515.05	617.	-182.	658.	-4.	3899	329
	920126	083727.69	630.	-51.	528.	-2.	3899	743
3908	63.37	108.38	-.0008	68 091 BL	189.97	920211		
	920210	211939.45	606.	-133.	-137.	0.	89298	221
3912	62.27	114.47	-.0004	68 091 B0	214.49	920211		
	920211	195226.35	756.	-404.	-868.	-9.	19111	396
3932	65.60	109.19	-.0001	61 OMI 223	4.19	920211		
	920211	064931.36	627.	-208.	760.	11.	93919	396
3938	63.03	117.21	-.0011	68 097 BS	19.08	920211		
	920211	080733.76	523.	81.	814.	8.	94707	399
3974	102.06	114.93	-.0000	68 069 E	186.63	920211		
	920211	131155.08	797.	-46.	-703.	7.	90062	395
4008	62.87	106.84	-.0023	68 091 BY	259.96	920211		
	920211	052307.17	398.	115.	171.	18.	89812	232
	920211	052331.74	348.	60.	90.	-9.0	89812	232
	920211	052523.17	299.	-6.	-349.	-18.	89812	232
	920211	052546.95	333.	14.	-469.	11.	89812	232
4053	30.32	123.77	-.0067	69 064 C	99.90	920211		
	920211	103545.78	865.	-302.	-755.	-4.	89832	231
	920211	103614.94	885.	-322.	-861.	-7.	89832	231
	920211	103641.84	907.	-340.	-962.	-10.	89832	231
	920211	103708.06	933.	-356.	-1063.	-12.	89832	231
	920211	103754.13	986.	-383.	-1248.	-16.	89832	231
	920211	103822.07	1022.	-399.	-1363.	-18.	89832	231
4119	81.21	95.61	-.0015	69 084 A	52.79	920211		
	920211	064813.17	301.	10.	-139.	-13.	89871	231
4141	69.90	100.28	-.0006	69 082 AJ	10.05	920211		
	920211	080648.38	464.	-3.	696.	13.	94707	399
4158	70.00	102.30	-.0001	69 082 AA	231.27	920211		
	920208	132305.70	476.	-117.	-1035.	3.	88079	398
4178	69.85	101.69	-.0005	69 082 AW	158.96	920211		
	920211	182853.30	406.	-172.	-616.	16.	95201	393
4191	70.51	100.22	-.0023	69 082 BE	109.64	920211		
	920211	091839.88	428.	-20.	-427.	-13.	89832	232
4193	69.95	103.87	-.0016	69 082 BG	273.25	920211		
	920211	011415.85	464.	-46.	515.	-6.	94679	399
4201	70.01	99.25	-.0024	69 082 BQ	91.81	920211		
	920211	185325.93	391.	-232.	1382.	1.	95217	393
4231	70.29	101.18	-.0015	69 082 CN	284.73	920211		
	920211	065701.25	447.	25.	16.	-14.	89324	232
	920211	064713.93	436.	-211.	-1293.	-6.	93035	393

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH		
	DATE	TIME	ALT	ΔU	ΔV	ΔW	TAG	SENSOR
4237	70.01	103.30	-.0000	69 082 E	216.00	920211		
	920211	035432.62	522.	-271.	1500.	-5.	86607	329
4327	99.16	106.06	-.0000	70 009 A	204.90	920211		
	920210	232803.48	565.	-9.	280.	3.	89413	242
4330	31.06	115.99	-.0084	70 011 A	78.34	920211		
	920211	113648.71	1001.	339.	523.	-12.	90447	385
	920211	031423.87	794.	93.	1236.	-7.	94567	399
	920211	051844.38	850.	34.	2078.	-2.	94699	399
	920211	113507.79	098.	120.	-373.	-3.	94719	399
4382	66.43	111.76	-.0005	70 034 A	294.84	920211		
	920210	235934.85	1124.	-326.	1563.	-8.	93877	396
4384	74.03	116.22	.0000	70 036 B	193.12	920211		
	920211	191140.42	784.	-72.	-744.	8.	95222	393
4421	62.78	109.85	-.0028	66 097 CF	65.05	920211		
	920211	144256.24	977.	120.	1148.	8.	90236	383
4515	90.06	106.84	-.0001	70 067 3	326.53	920211		
	920211	061147.69	490.	-83.	336.	-19.	93915	396
	920211	061157.56	490.	-79.	259.	-9.	93915	396
	920211	061207.43	489.	-75.	183.	2.	93915	396
	920211	061217.30	489.	-73.	107.	12.	93915	396
4594	62.97	107.19	-.0041	70 089 A	292.68	920211		
	920211	064807.63	583.	-66.	-547.	12.	90000	329
	920211	012805.72	277.	-360.	206.	-15.	93888	396
4612	99.78	103.89	-.0003	70 025 0	219.00	920211		
	920210	211936.45	486.	18.	4.	-12.	89298	221
4613	99.07	103.42	-.0019	70 025 R	115.46	920211		
	920211	031835.67	493.	-58.	-70.	14.	94687	399
4637	99.78	105.98	-.0001	70 025 V	170.83	920211		
	920211	061511.19	566.	-0.	1.	-0.	93915	396
4642	99.94	103.79	-.0033	70 025 AA	195.38	920211		
	920210	225040.46	499.	-15.	86.	14.	89416	242
	920210	225117.77	530.	16.	-56.	3.	89416	242
4647	99.91	98.64	-.0049	70 025 AF	297.09	920211		
	920211	172952.42	324.	-3.	-11.	-12.	90003	241
	920211	173019.24	316.	-13.	-120.	-5.	90000	241
4654	100.03	104.31	-.0006	70 025 AN	359.25	920211		
	920211	100130.79	493.	-205.	-1147.	-3.	93938	396
4664	02.76	104.76	-.0045	70 091 R	58.09	920211		
	920213	131155.08	797.	-7.	1392.	5.	90062	395
4698	63.11	109.40	-.0034	70 089 0	311.45	920211		
	920211	064807.63	583.	49.	1220.	-11.	90000	329
4738	100.14	104.30	-.0004	70 025 CM	78.31	920211		
	920211	051116.85	495.	-2.	27.	-12.	89810	232
4744	100.17	106.45	-.0001	70 025 CT	23.88	920211		
	920210	202051.21	578.	-10.	284.	8.	89207	221

SAT	INC / DATE	PERIOD / TIME	DRAG / ALT	INTL DESIG / ΔU	R.A. / ΔV	EPOCH / ΔW	TAG	SENSOR
4759	99.94	105.76	-.0004	70 025 OH	134.80	920211		
	920207	161921.30	569.	-158.	-1160.	16.	21538	384
4820	99.71	104.79	-.0020	70 025 EB	319.73	920211		
	920211	171425.97	520.	-245.	1322.	-10.	94742	399
4841	120.78	155.30	-.0002	68 055 0	262.56	920211		
	920211	073846.40	1662.	268.	382.	17.	89324	232
4856	99.71	102.91	-.0004	70 025 EL	125.82	920211		
	920124	052920.50	515.	39.	316.	11.	12102	385
4857	99.79	103.58	-.0016	70 025 EM	215.34	920231		
	920210	094052.78	535.	-265.	-1525.	-19.	15390	398
4862	99.62	100.12	-.0081	70 025 ES	171.88	920211		
	920211	081128.50	377.	-185.	-1060.	-9.	90000	329
4863	99.75	102.43	-.0026	70 025 ET	244.76	920211		
	920211	191058.55	482.	-91.	-918.	-3.	95223	393
4869	99.97	98.13	-.0051	70 025 EZ	13.20	920211		
	920210	093716.01	316.	-110.	918.	-5.	15390	398
4881	11.93	1456.87	.0003	71 006 A	45.26	920205		
	920210	223052.30	19525.	-390.	4234.	38.	89405	242
	920210	223123.74	19525.	-390.	4234.	45.	89405	242
	920210	225947.88	19541.	-32.	1524.	-12.	89413	242
	920210	230020.69	19541.	-32.	1524.	-8.	89413	242
	920210	230113.87	19541.	-33.	1524.	-2.	89413	242
	920210	230142.26	19541.	-33.	3525.	2.	89413	242
	920210	230244.97	19541.	-33.	1525.	9.	89413	242
	920210	230314.40	19540.	-33.	1525.	13.	89413	242
	920210	230347.57	19540.	-33.	1525.	17.	89413	242
	920210	230431.24	19540.	-33.	1525.	22.	89413	242
	920210	230559.01	19540.	-34.	1525.	33.	89413	242
	920210	230640.35	19540.	-34.	1526.	38.	89413	242
	920210	230710.23	19540.	-34.	1525.	41.	89413	242
	920210	230740.94	19540.	-34.	1526.	45.	89413	242
4942	63.08	111.94	-.0014	70 091 AK	193.62	920211		
	920211	203747.63	362.	12.	-13.	-12.	4942	399
4964	65.72	113.20	-.0001	71 015 A	64.40	920211		
	920210	223456.82	908.	-129.	-558.	-8.	90220	395
4969	99.63	98.73	-.0119	70 025 OP	159.73	920211		
	920211	081128.50	377.	-36.	-488.	5.	90000	329
4976	99.67	101.24	-.0057	70 025 GW	15.83	920211		
	920213	182730.53	406.	-86.	523.	18.	95201	393
4981	99.89	100.60	-.0075	70 025 HB	31.48	920231		
	920211	182853.30	406.	-43.	-507.	3.	95201	393
5010	85.88	110.35	-.0020	71 015 0	145.34	920211		
	920211	224607.33	473.	-80.	-1.	11.	95291	393
5013	65.00	111.83	-.0030	71 015 G	158.22	920211		
	920211	212305.36	286.	-229.	-1155.	-18.	90000	329
5014	65.62	109.20	-.0028	71 015 H	356.59	920211		
	920211	204343.29	697.	-76.	371.	16.	93455	399

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
5015	65.73	109.54	-.0013	71 015 J	344.75	920211		
	920211	122649.15	589.	204.	-691.	4.	86660	329
5042	65.66	110.40	-.0024	71 015 P	178.59	920211		
	920128	232902.17	904.	-116.	-154.	-2.	38892	398
5076	62.80	112.73	-.0003	70 089 AP	250.33	920210		
	920209	151846.06	1040.	-207.	959.	-7.	88079	398
	920211	015337.55	473.	-103.	600.	17.	94682	399
5093	62.73	101.01	-.0124	70 091 AQ	288.21	920211		
	920211	184313.72	551.	244.	-457.	-19.	93983	396
5095	05.53	96.07	-.0450	71 015 V	192.94	920211		
	920211	212305.36	286.	-215.	1378.	-13.	90000	329
5144	65.74	108.57	-.0029	71 015 AO	298.89	920211		
	920211	073428.79	801.	166.	-1445.	-0.	89376	232
5148	99.70	101.92	-.0033	70 025 JR	289.69	920211		
	920211	224758.63	474.	-44.	615.	13.	95291	393
5192	65.60	106.20	-.0012	71 015 AP	318.87	920211		
	920211	171451.74	489.	-323.	347.	1.	94742	399
5197	65.60	110.72	-.0035	71 015 AT	287.27	920211		
	920211	031524.53	899.	-170.	1411.	11.	94567	399
5242	82.70	97.35	-.0146	70 069 BO	198.19	920211		
	920210	230113.87	372.	80.	374.	4.	89413	242
	920210	230142.26	307.	28.	238.	-10.	89413	242
5281	73.98	100.49	-.0046	71 052 A	351.20	920211		
	920209	072430.52	168.	-97.	-705.	-7.	15390	398
	920211	205718.99	459.	44.	-145.	5.	94000	396
5322	61.30	111.75	-.0023	08 097 CJ	233.49	920211		
	920210	235311.41	607.	-393.	-2376.	-6.	88075	399
5349	99.77	105.69	-.0101	70 025 KN	177.73	920211		
	920211	083930.42	609.	45.	403.	2.	90000	329
5350	99.72	102.29	-.0028	70 025 KP	304.48	920211		
	920211	194610.19	423.	-261.	1212.	-13.	86622	329
5417	62.82	102.90	-.0048	68 097 CL	202.02	920211		
	920210	094148.35	603.	-116.	941.	9.	15390	398
5435	50.15	99.75	-.0007	71 071 A	72.79	920211		
	920211	011328.18	418.	-196.	-1239.	5.	94679	399
5446	100.41	106.73	-.0003	70 025 LE	314.42	920211		
	920211	212322.30	623.	-179.	1226.	16.	90000	329
5498	32.03	111.82	-.0000	71 060 B	264.11	920211		
	920211	174940.71	981.	192.	601.	13.	89415	241
	920211	175001.63	942.	160.	512.	9.	89416	242
	920211	175006.70	933.	151.	505.	13.	89415	241
	920211	175039.33	681.	104.	386.	8.	89415	241
	920211	175040.69	879.	103.	370.	3.	89416	242
	920211	175147.94	803.	26.	133.	-0.	89418	242
	920211	175257.00	778.	-12.	[illegible]	6.	39416	242

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
5531	66.68	102.19	-.0008	71 015 BV	236.52	920211		
	920211	220345.70	494.	-86.	-873.	-9.	95283	393
5581	82.05	104.72	-.0004	71 093 B	284.41	920211		
	920211	073057.02	472.	-17.	-166.	-6.	89810	232
	920211	073121.06	476.	-13.	-263.	1.	89810	232
	920211	073142.81	489.	-2.	-354.	13.	89810	232
5638	62.50	103.82	-.0048	70 089 CJ	158.24	920211		
	920211	224607.33	473.	-24.	112.	12.	95291	393
5685	74.03	104.67	-.0000	71 111 B	179.07	920211		
	920211	080758.15	557.	-175.	-1273.	-14.	94707	399
5760	65.63	91.61	-.5215	71 015 CC	236.40	920210		
	920211	040413.99	171.	7.	-27.	-7.	90009	329
5761	65.84	100.64	-.0135	71 015 CD	347.82	920211		
	920203	220536.66	296.	-195.	1297.	-7.	19994	399
5763	66.97	109.93	-.0011	71 015 CF	226.95	920211		
	920211	113545.63	751.	-86.	-1706.	-9.	94719	399
	920211	224607.33	473.	-84.	-631.	12.	95291	390
5795	62.90	104.74	-.0068	70 089 CL	26.85	920211		
	920211	061511.19	566.	249.	333.	-1.	93915	396
	920211	131148.50	254.	-30.	19.	1.	94145	393
5824	97.88	109.58	-.0018	70 025 MJ	32.44	920211		
	920211	191146.42	784.	277.	79.	2.	95222	393
5994	84.96	170.98	-.0062	63 014 DA	37.03	920211		
	920129	235327.88	1162.	216.	1505.	21.	88788	398
6058	26.22	650.26	.0010	72 041 B	153.23	920211		
	920211	180652.43	1026.	4.	-23.	-0.	90244	382
6085	62.78	102.03	-.0028	70 089 CT	275.57	920211		
	920211	003625.65	644.	-337.	-1780.	1.	90000	329
	920211	060132.72	628.	3.	77.	17.	89376	232
	920211	060157.17	614.	-10.	-12.	10.	89376	232
	920211	060335.96	622.	4.	14.	-10.	89810	232
	920211	060356.07	635.	17.	-59.	3.	89810	232
6118	74.03	114.32	-.0000	72 057 B	272.41	920211		
	920211	015828.34	832.	26.	-83.	-21.	94682	399
6278	9.96	1457.10	-.0009	72 090 A	52.60	920211		
	920210	223052.30	19559.	-4.	-1138.	-26.	89405	242
	920210	223123.74	19558.	-4.	-1137.	-22.	89405	242
	920210	223157.03	19558.	-4.	-1136.	-18.	89405	242
	920210	223225.69	19558.	-4.	-1136.	-14.	89405	242
	920210	223358.66	19557.	-5.	-1334.	-3.	89407	242
	920210	223430.21	19557.	-5.	-1134.	2.	89407	242
	920210	223458.74	19556.	-5.	-1133.	5.	89407	242
	920210	223607.20	19556.	-5.	-1332.	14.	89407	242
	920210	231048.99	19566.	-286.	-3855.	-49.	89413	242
	920210	232656.94	19563.	-287.	-3847.	-1.	89413	242
	920210	232721.32	19563.	-287.	-3847.	0.	89413	242
	920210	232742.25	19563.	-287.	-3847.	2.	89413	242
	920210	232803.48	19563.	-287.	-3847.	3.	89413	242
6306	99.63	111.79	-.0001	72 097 B	305.23	920211		

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
	920113	055423.13	706.	10.	-564.	20.	12102	399
	920113	055509.31	706.	-59.	-918.	-14.	12102	399
6675	74.02	114.61	-.0000	73 037 A	322.80	920231		
	920211	092047.21	733.	-24.	-43.	-12.	89376	232
6676	74.02	115.31	-.0000	73 037 B	92.72	920211		
	920211	084307.59	824.	-169.	1323.	-18.	89336	232
6681	74.02	113.99	.0000	73 037 G	203.72	920211		
	920206	095345.03	700.	-117.	-875.	7.	15390	398
6752	62.29	112.57	-.0015	68 091 CJ	240.58	920211		
	920211	135429.55	448.	-92.	335.	-17.	80069	399
	920211	175606.24	404.	-414.	356.	-11.	93974	396
6779	28.03	656.29	0.0000	67 001 X	83.07	920210		
	920207	072808.50	167.	-238.	521.	-6.	15390	398
	920207	072826.65	166.	-243.	522.	-15.	15390	398
	920207	072845.71	165.	-250.	523.	-25.	15390	398
	920207	072904.82	166.	-256.	525.	-35.	15390	398
	920207	072924.02	167.	-263.	527.	-44.	15390	398
	920211	094655.26	1041.	413.	490.	36.	89832	233
	920211	095352.86	663.	33.	-1463.	-47.	89832	232
	920211	095416.79	749.	37.	-1675.	-45.	89832	232
	920211	095438.82	831.	32.	-1873.	-43.	89832	232
6826	74.02	113.41	.0000	73 064 B	103.15	920211		
	920211	090126.29	758.	0.	13.	6.	89832	232
	920211	090146.90	745.	-14.	-61.	-9.	89832	232
6828	82.94	104.77	-.0000	73 065 A	96.22	920211		
	920211	073559.85	541.	-175.	1193.	-12.	89812	232
	920211	073620.29	502.	-180.	1072.	-14.	89812	232
6843	65.69	107.50	-.0028	71 015 CK	38.26	920211		
	920208	120547.77	544.	111.	184.	-8.	21538	398
	920210	211850.51	787.	342.	642.	-17.	89298	221
6844	65.91	108.42	-.0033	71 015 CL	135.71	920211		
	920211	190627.82	866.	-272.	1563.	-13.	95219	393
6846	74.00	114.92	-.0000	73 069 3	9.26	920211		
	920210	223052.30	782.	-19.	-315.	12.	89405	242
6938	96.93	114.58	-.0000	73 088 0	24.60	920211		
	920211	131840.00	791.	9.	-123.	-12.	90233	383
6976	13.18	1514.99	0.0060	73 100 0	46.12	920211		
	920211	094223.80	19957.	-729.	-4069.	14.	89832	233
	920211	094258.77	19956.	-726.	-4057.	-7.	89832	233
	920211	094331.28	19955.	-723.	-4045.	-25.	89832	233
	920211	094402.72	19955.	-720.	-4034.	-45.	89832	233
6985	74.03	113.99	-.0000	73 104 A	212.68	920211		
	920211	191448.82	775.	7.	161.	-1.	95222	393
7004	73.98	103.21	-.0029	73 107 B	46.00	920231		
	920113	055312.35	705.	52.	-1396.	-18.	12102	399
	920113	055336.03	705.	40.	-1411.	10.	12102	399
7015	101.75	123.50	-.0000	73 086 F	208.21	920211		
	920231	203800.34	1154.	-9.	-7.	14.	7015	399

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH	TAG	SENSOR
	DATE	TIME	ALT	ΔU	ΔV	ΔW		
7017	102.38	116.43	-.0000	73 086 H	34.81	920211		
	920202	213449.99	832.	-295.	1597.	-0.	88968	398
7035	101.79	121.88	.0000	73 066 AB	4.74	920211		
	920210	200639.51	791.	-382.	1095.	-8.	82080	222
	920210	200720.38	785.	-356.	948.	8.	82080	222
7074	101.94	113.23	-.0000	73 086 BS	122.38	920211		
	920211	141832.10	779.	99.	223.	-6.	89505	221
7076	102.12	116.19	-.0000	73 086 BU	14.37	920211		
	920211	191017.87	788.	-371.	-1665.	9.	95222	393
7079	101.94	116.73	-.0000	73 086 BX	9.78	920211		
	920117	033604.77	856.	-227.	1457.	4.	21538	329
7088	102.38	112.90	-.0008	73 086 CG	354.11	920210		
	920211	193756.79	638.	-228.	636.	-1.	90000	329
7126	102.09	116.55	-.0003	73 086 CQ	21.12	920211		
	920210	230431.24	769.	17.	71.	-20.	89413	242
	920210	230559.01	744.	-26.	-270.	7.	89413	242
	920210	230640.35	775.	-13.	-441.	19.	89413	242
7137	101.91	115.01	-.0002	73 086 DB	33.42	920211		
	920211	191315.07	780.	-66.	-664.	-19.	95222	393
7162	101.51	114.46	-.0007	73 086 EA	302.61	920211		
	920211	175401.07	796.	20.	77.	-4.	89416	242
7182	102.45	113.56	.0000	73 086 ET	315.24	920211		
	920211	051543.14	776.	-98.	960.	14.	94699	399
7210	81.24	102.03	-.0001	74 011 B	98.89	920211		
	920211	073938.33	472.	-136.	1162.	-3.	89324	232
	920211	074001.84	426.	-141.	1014.	7.	89324	232
7213	97.81	100.41	-.0004	74 013 A	29.55	920211		
	920211	191058.55	482.	93.	-260.	-5.	95223	393
7218	99.10	101.00	-.0002	74 015 A	201.54	920211		
	920211	080948.96	428.	-202.	1154.	11.	90000	329
7273	74.02	117.04	.0000	74 024 J	16.00	920211		
	920211	074226.79	887.	-165.	1401.	13.	93925	396
	920211	074236.71	884.	-168.	1399.	4.	93925	396
	920211	074246.53	881.	-171.	1398.	-11.	93925	396
7324	32.14	1430.39	0.0000	74 039 C	41.95	920211		
	920210	223733.02	19316.	0.	1.	-2.	89409	242
	920210	223804.25	19316.	0.	1.	-2.	89409	242
	920210	223832.15	19316.	0.	1.	-2.	89409	242
	920210	223900.67	19316.	0.	1.	-2.	89409	242
	920210	224923.21	19305.	-71.	-1622.	-37.	89416	242
	920210	224954.97	19305.	-71.	-1622.	-32.	89416	242
	920210	225040.46	19305.	-71.	-1622.	-26.	89416	242
	920210	225117.77	19305.	-71.	-1622.	-20.	89416	242
	920210	225302.73	19304.	-72.	-1621.	-5.	89417	242
	920210	225336.57	19304.	-72.	-1620.	0.	89417	242
	920210	225410.08	19304.	-72.	-1621.	5.	89417	242
	920210	225448.37	19304.	-72.	-1621.	11.	89417	242
7337	82.96	104.71	-.0018	74 044 A	225.26	920211		

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH	TAG	SENSOR
	DATE	TIME	ALT	ΔU	ΔV	ΔW		
	920208	120845.65	295.	-379.	1375.	10.	21538	398
7376	61.76	717.60	.0156	74 056 A	123.94	920211		
	920211	034516.97	15154.	357.	13736.	-26.	83410	334
	920211	034526.89	15158.	405.	13714.	-40.	83410	334
	920211	034536.82	15170.	431.	13722.	-16.	83410	334
	920211	034546.75	15178.	477.	13706.	-12.	83410	334
	920211	034617.26	15205.	626.	13654.	21.	83410	334
	920211	034636.01	15223.	698.	13643.	45.	83410	334
7443	74.03	117.75	-.0000	74 072 J	127.88	920211		
	920210	223448.82	910.	-45.	768.	-11.	90220	395
	920210	223458.82	908.	-40.	768.	-12.	90220	395
	920210	223508.82	908.	-43.	768.	-12.	90220	395
	920210	223516.82	909.	-45.	767.	-12.	90220	395
	920210	223528.82	910.	-43.	767.	-11.	90220	395
	920210	223538.82	910.	-43.	766.	-10.	90220	395
	920210	223548.82	910.	-42.	765.	-10.	90220	395
	920210	223558.82	910.	-41.	764.	-10.	90220	395
	920210	223608.82	910.	-41.	763.	-9.	90220	395
	920210	223618.82	910.	-40.	742.	-9.	90220	395
7487	103.18	102.58	-.0018	73 086 FT	150.26	920211		
	920211	195321.20	380.	-12.	63.	9.	82082	243
	920211	195345.85	400.	10.	-34.	-0.	82082	243
	920211	195409.30	438.	47.	-123.	-11.	82082	243
7488	102.61	120.77	-.0022	73 086 FU	236.68	920211		
	920129	235511.74	970.	-85.	-1603.	-11.	88788	398
7648	10.71	1447.07	0.0000	75 011 A	51.64	920208		
	920210	225629.64	19526.	-634.	-5666.	-6.	89415	242
	920210	225706.13	19526.	-634.	-5665.	-5.	89415	242
	920210	225738.49	19526.	-834.	-5665.	-5.	89415	242
	920210	225805.88	19526.	-634.	-5664.	-5.	89415	242
7714	81.21	102.38	-.0001	75 023 A	193.03	920211		
	920210	224108.97	460.	-9.	44.	-2.	89412	242
7780	62.05	717.55	.0015	75 036 A	269.04	920211		
	920119	171712.01	1538.	-1273.	3518.	-41.	11718	398
7794	24.43	395.13	-.0454	75 038 0	242.38	920211		
	920211	135603.88	1067.	-479.	3069.	-48.	94637	399
7831	73.99	117.99	-.0000	75 045 J	128.02	920211		
	920210	223448.82	910.	0.	8.	-4.	90220	395
	920210	223458.82	908.	-2.	8.	-6.	90220	395
	920210	223508.82	908.	-2.	8.	-6.	90220	395
	920210	223518.82	909.	-2.	8.	-5.	90220	395
	920210	223528.82	910.	-1.	8.	-4.	90220	395
	920210	223538.82	910.	-1.	8.	-4.	90220	395
	920210	223548.82	910.	-1.	7.	-4.	90220	395
	920210	223558.82	910.	-1.	7.	-3.	90220	395
	920210	223608.82	910.	-1.	6.	-3.	90220	395
	920210	223618.82	910.	-1.	6.	-3.	90220	395
7842	98.00	96.98	-.0059	72 058 N	200.11	920211		
	920205	214705.85	304.	-127.	740.	-4.	19994	399
	920210	093716.01	316.	3.	362.	-11.	15390	398
7850	98.16	102.40	-.0014	72 058 W	217.29	920211		
	920211	182446.10	406.	-222.	585.	-20.	95201	393

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
7851	98.29	101.23	-.0022	72 058 X	55.22	920211		
	920211	215900.43	514.	-379.	1968.	-12.	95283	393
7855	98.03	99.43	-.0040	72 058 A8	40.61	920211		
	920119	123502.89	343.	-72.	-788.	1.	87302	396
	920119	123512.76	343.	-88.	-862.	-18.	87302	396
7943	98.39	98.11	-.0026	72 058 AB	83.93	920211		
	920211	011211.40	358.	-323.	1552.	13.	94679	399
7959	97.98	102.64	-.0003	72 058 CP	92.30	920211		
	920211	011415.85	464.	47.	-632.	5.	94679	399
8015	62.06	718.99	0.0000	75 063 A	270.73	920211		
	920211	015706.30	705.	-1166.	-2172.	-1.	94682	399
8084	98.58	107.88	-.0007	72 058 DK	240.19	920211		
	920122	120013.03	343.	-198.	945.	-5.	87302	396
	920122	120022.94	343.	-196.	946.	-4.	87302	396
	920122	120032.77	343.	-195.	946.	-3.	87302	396
	920211	193756.79	638.	205.	604.	-4.	90000	329
8127	81.22	92.84	-.0100	75 076 A	117.01	920211		
	920211	125447.90	237.	-41.	-650.	14.	94139	393
	920211	125625.30	238.	-268.	-1422.	18.	94139	393
8133	25.33	103.04	-.0030	75 077 B	330.81	920211		
	920129	235803.60	683.	-28.	-1733.	-15.	88788	398
8145	101.10	114.39	-.0001	74 089 P	251.94	920211		
	920211	191146.42	784.	-6.	-340.	-15.	95222	393
8159	101.78	115.31	-.0003	74 089 7	57.88	920211		
	920211	122444.75	600.	-312.	-1450.	-19.	93957	396
8178	101.98	117.15	-.0006	74 089 AO	225.34	920211		
	920230	210033.55	935.	-1.	-41.	2.	89207	221
8181	101.46	116.21	-.0000	74 089 Ax	219.85	920211		
	920211	102122.78	777.	-14.	-152.	13.	94491	399
8302	101.19	105.93	-.0029	74 089 BK	287.07	920211		
	920211	031835.67	493.	-152.	-1105.	-16.	94687	399
8314	98.60	99.15	-.0012	72 058 EG	72.46	920211		
	920211	001602.91	346.	-79.	822.	-1.	86631	329
8402	101.44	113.09	-.0042	74 089 CE	24.28	920211		
	920211	131900.09	327.	-31.	1032.	-6.	96233	383
8405	102.67	127.77	-.0002	74 089 CH	278.90	920211		
	920206	145927.72	876.	-236.	-683.	-14.	88079	398
8462	62.72	733.49	.0091	75 105 D	310.14	920211		
	920211	053816.92	10071.	-18.	-562.	-44.	89812	232
	920211	053905.00	9988.	-24.	-618.	-33.	89812	232
	920211	053934.41	9936.	-28.	-653.	-27.	89812	232
	920211	054001.99	9888.	-32.	-685.	-21.	89812	232
	920211	054029.14	9840.	-36.	-716.	-15.	89812	232
8513	12.11	1435.77	0.0000	75 123 A	40.88	920211		
	920210	224108.97	19325.	-0.	1.	4.	89412	242
	920210	224146.21	19325.	-0.	1.	4.	89412	242

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
	920210	224225.01	19324.	-0.	1.	4.	89412	242
	920210	224301.39	19324.	-0.	1.	4.	89412	242
	920210	224923.21	19308.	-69.	-1547.	47.	89416	242
8542	97.92	104.60	-.0004	72 058 GR	236.69	920211		
	920117	115443.05	343.	-232.	-954.	-10.	87302	396
	920117	115452.92	343.	-233.	-953.	-8.	87302	396
	920117	115502.79	342.	-234.	-952.	-6.	87302	396
8547	46.57	328.28	-.2400	75 123 E	160.23	920209		
	920211	165652.54	2785.	-94.	153.	0.	8547	334
	920211	165709.41	2753.	-94.	155.	-1.	8547	334
	920211	165753.26	2668.	-95.	156.	1.	8547	334
	920211	165814.93	2625.	-95.	155.	-2.	8547	334
	920211	165853.48	2550.	-96.	157.	-0.	8547	334
	920211	165915.29	2507.	-93.	1561	-3.	8547	334
8593	102.02	113.32	-.0000	74 089 DG	45.92	920211		
	920211	201916.29	644.	-190.	1216.	9.	86628	329
8745	82.94	101.83	-.0034	76 022 B	103.90	920211		
	920211	085601.02	688.	114.	-339.	-7.	89336	232
8789	102.24	116.25	-.0000	74 089 DR	2.21	920211		
	920211	190627.82	866.	43.	-678.	-3.	95219	393
8968	97.64	101.64	-.0006	75 004 BA	17.56	920211		
	920210	201902.81	376.	-127.	381.	2.	82080	222
8980	97.83	99.51	-.0009	75 004 BN	22.23	920211		
	920210	200204.24	430.	-3.	8.	-4.	89207	221
9416	11.83	1436.19	0.0000	76 092 A	43.90	920209		
	920210	224446.40	39426.	-607.	-5586.	-13.	89413	242
	920210	224519.31	19425.	-608.	-5587.	-9.	89413	242
	920210	224554.37	19425.	-608.	-5587.	-5.	89413	242
	920210	224624.95	19425.	-608.	-5588.	-1.	89413	242
9503	11.77	1436.85	0.0000	76 107 A	44.41	920211		
	920210	224446.40	19227.	-19.	1237.	-45.	89413	242
	920210	224519.31	19227.	-19.	1236.	-41.	89413	242
9506	64.62	711.78	-.0105	76 105 0	299.24	920210		
	920211	073057.02	1181.	78.	-732.	9.	89810	232
	920211	073121.06	1193.	103.	-847.	20.	89810	232
	920211	073142.81	1210.	329.	-954.	33.	89810	232
9666	99.28	107.69	-.0008	70 025 HK	299.66	920211		
	920211	174235.53	671.	27.	92.	-6.	89415	241
	920211	174250.79	652.	9.	37.	-10.	89417	242
	920211	174354.95	619.	-26.	-209.	20.	89415	241
	920211	174407.61	622.	-26.	-258.	14.	89417	242
9681	97.91	100.22	-.0003	75 004 DC	48.91	920211		
	920211	064713.93	436.	-377.	1669.	8.	93035	393
9723	65.78	113.92	-.0016	76 126 U	70.59	920211		
	920211	015451.93	548.	17.	-822.	2.	94682	399
9795	102.02	114.45	-.0000	74 089 EA	264.41	920211		
	920211	033904.59	711.	-1281	1240.	10.	93901	396
	920211	015700.30	705.	-389.	1742.	-13.	94682	399

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
9799	65.61	313.29	-.0003	76 126 Z	125.99	920211		
	920119	123453.02	343.	-305.	1506.	-6.	87302	396
9819	65.93	108.63	-.0051	76 126 AF	190.24	920211		
	920211	225736.68	637.	-44.	1569.	4.	90000	329
9826	65.82	110.99	-.0034	76 126 AN	141.21	920211		
	920211	063818.29	1011.	140.	-586.	5.	94702	399
9827	65.83	108.19	-.0047	76 126 AP	220.81	920211		
	920211	035432.62	522.	-311.	1269.	14.	86607	329
9829	63.03	717.56	.0001	77 010 A	355.05	920211		
	920211	073938.33	8573.	-69.	-2132.	45.	89324	232
	920211	074001.84	6534.	-69.	-2150.	36.	89324	232
9852	10.47	1440.05	0.0000	77 014 A	52.02	920211		
	920210	225629.64	19437.	-577.	-5391.	23.	89415	242
	920210	225706.13	19437.	-577.	-5391.	23.	89415	242
	920210	225738.49	19437.	-577.	-5391.	23.	89415	242
	920210	225805.88	19437.	-577.	-5390.	23.	89415	242
9921	67.70	724.08	.0115	77 027 D	85.92	920211		
	920211	064649.66	19631.	2.	715.	40.	89871	231
9951	65.81	111.56	-.0013	76 326 AR	207.72	920210		
	920211	182447.91	986.	-306.	-1439.	2.	10617	396
	920129	235638.11	822.	43.	-766.	12.	88788	398
	920211	102022.85	695.	-30.	348.	-17.	94491	399
9962	65.81	109.80	-.0031	76 126 BC	34.04	920212		
	920211	101933.53	631.	119.	-668.	17.	94491	399
9973	62.42	109.09	-.0030	6806.7 DV	197.20	920209		
	920211	003102.63	453.	-350.	1105.	15.	90000	329
9982	65.90	133.55	-.0002	77 012 F	16.78	920211		
	920210	230431.24	1709.	172.	-2144.	-21.	89413	242
10010	65.86	117.05	.0000	77 036 A	199.64	920211		
	920129	235410.28	1081.	-389.	2237.	16.	88788	398
10013	65.87	117.03	-.0000	77 036 C	200.91	920231		
	920211	090755.60	1160.	201.	690.	-5.	90437	385
	920211	131940.26	904.	-317.	-974.	14.	90233	363
10092	62.70	708.87	-.1774	77 054 A	32.65	920211		
	920211	073534.40	21271.	-58.	814.	4.	89812	232
	920211	073559.85	21267.	-59.	815.	7.	89812	232
	920211	073620.29	21264.	-59.	816.	10.	89812	232
	920211	073641.53	21251.	-59.	816.	12.	89812	232
10144	29.08	108.77	-.0005	77 065 B	174.25	920211		
	920211	152506.47	699.	-81.	1342.	-16.	81580	399
	920129	235511.74	970.	276.	-1079.	1.	88788	398
10178	28.74	120.83	-.0011	77 065 G	24.39	920212		
	920211	025141.64	465.	-46.	230.	-1.	93690	399
10183	29.21	108.09	-.0008	77 065 M	165.63	920213		
	920126	232902.17	604.	-129.	-1010.	7.	88892	398
10184	29.05	109.91	-.0006	77 065 N	211.59	920211		

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
	920211	154334.42	418.	-159.	-1469.	3.	19261	399
	920210	234322.80	1029.	-360.	-2401.	-20.	90406	385
10198	29.56	111.33	.0000	77 065 AB	129.13	920211		
	920211	175828.40	1043.	56.	684.	-2.	90004	241
	920211	175847.64	1016.	43.	613.	-10.	89416	242
	920211	175859.75	1002.	36.	566.	16.	90004	241
10202	29.17	99.06	-.0144	77 065 AF	326.94	920211		
	920211	021535.47	336.	-274.	-1011.	11.	94560	399
10211	29.43	114.97	-.0001	77 065 AQ	161.40	920211		
	920200	095345.03	700.	-75.	1516.	-14.	15390	398
	920205	130558.03	515.	-213.	-108.	19.	88079	398
10212	28.93	103.96	-.0079	77 065 H	211.40	920211		
	920211	135429.55	448.	100.	333.	10.	80069	399
	920211	154334.42	418.	-69.	1169.	10.	19261	399
10226	29.15	101.95	-.0079	77 065 BD	202.75	920211		
	920124	052920.50	515.	5.	-214.	-1.	12102	385
10246	29.04	104.65	-.0065	77 065 BX	47.16	920212		
	920211	073057.02	497.	-53.	111.	15.	89810	232
	920211	073121.06	530.	-24.	42.	20.	89810	232
10252	28.65	110.52	-.0007	77 065 CD	27.25	920211		
	920211	091049.88	351.	29.	-96.	15.	89376	232
10262	29.08	107.84	-.0025	77 065 CP	341.02	920212		
	920211	220531.05	268.	-354.	950.	14.	94745	399
10269	29.09	101.03	-.0053	77 065 CW	77.76	920211		
	920211	091904.06	497.	-179.	-363.	16.	89832	232
10286	74.03	114.40	-.0000	77 079 B	318.66	920211		
	920211	103614.94	801.	10.	230.	-5.	89832	231
	920211	103641.84	795.	8.	128.	8.	89832	231
	920211	103708.06	795.	10.	30.	15.	89832	231
	920211	103754.13	810.	23.	-143.	18.	89832	231
10338	29.07	107.57	-.0027	77 065 DM	211.89	920211		
	920211	104927.81	883.	-66.	-876.	-3.	94257	399
10346	29.23	109.90	-.0024	77 065 DV	191.84	920211		
	920211	124642.45	291.	-386.	-775.	-10.	14362	399
10365	11.34	1436.88	0.0000	77 092 A	47.46	920211		
	920210	223052.30	19411.	-550.	5080.	-13.	89405	242
	920210	223123.74	19411.	-551.	5080.	-7.	89405	242
	920210	223157.03	19411.	-551.	5080.	-2.	89405	242
	920210	223225.69	19411.	-551.	5080.	4.	89405	242
	920210	223358.66	19410.	-552.	5080.	20.	89407	242
	920210	223430.21	19410.	-552.	5080.	25.	89407	242
	920210	223458.74	19410.	-552.	5080.	30.	89407	242
	920210	223607.20	19410.	-552.	5080.	42.	89407	242
	920210	230244.97	19434.	-88.	2382.	-47.	89413	242
	920210	230314.40	19434.	-88.	2382.	-44.	89413	242
	920210	230347.57	19434.	-88.	2382.	-41.	89413	242
	920210	230431.24	19434.	-88.	2382.	-36.	89413	242
	920230	230559.01	19434.	-88.	2381.	-27.	89413	242
	920210	230640.35	19434.	-88.	2381.	-24.	89413	242
	920210	230710.23	19434.	-88.	2381.	-21.	89413	242

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
	920210	230740.94	19434.	-88.	2381.	-18.	89413	242
	920210	230912.44	19434.	-89.	2380.	-9.	89413	242
	920210	230946.67	19434.	-89.	2380.	-5.	89413	242
10417	65.58	115.63	-.0001	76 067 L	37.77	920208		
	920113	055509.32	706.	-81.	-416.	-1.	12102	399
10436	66.02	116.51	-.0001	76 067 M	54.75	920211		
	920210	223448.82	910.	-284.	1513.	17.	90220	395
10444	05.80	115.22	-.0001	75 067 V	28.97	920212		
	920211	074246.53	681.	-400.	2500.	-0.	93925	396
10445	65.96	119.23	-.0002	75 067 W	197.99	920211		
	920210	230020.69	1207.	13.	961.	20.	89413	242
	920210	230113.87	1135.	-13.	748.	-2.	89413	242
	920210	230142.26	1104.	-23.	639.	-13.	89413	242
	920211	090645.29	1124.	-97.	-1498.	19.	90437	385
	920211	090655.34	1131.	-96.	-1524.	-15.	90437	385
10447	65.87	116.50	-.0001	76 067 Y	326.72	920212		
	920211	092134.88	610.	15.	34.	10.	89376	232
	920211	092159.30	581.	-18.	-41.	-13.	89376	232
10449	66.02	115.64	.0000	76 067 AA	194.71	920211		
	920210	224554.37	624.	-20.	248.	14.	89413	242
	920210	224624.95	628.	-19.	132.	6.	89413	242
10453	65.80	116.02	-.0000	76 007 AE	201.63	920211		
	920211	182408.83	993.	347.	-1080.	-7.	93979	396
	920211	182418.32	991.	345.	-1080.	11.	93979	396
10454	65.67	115.12	-.0001	76 067 AF	335.24	920211		
	920211	100816.72	670.	9.	483.	8.	89813	232
	920211	100844.12	641.	-1.	368.	-6.	89813	232
	920211	100911.49	620.	-6.	256.	-14.	89813	232
	920211	100943.36	607.	-5.	128.	-16.	89813	232
	920211	075245.98	595.	-393.	-436.	2.	86768	329
10463	65.82	116.92	.0000	76 067 AG	36.91	920212		
	920211	131950.30	924.	360.	479.	-2.	90233	383
10470	29.08	107.40	-.0031	77 065 EC	304.10	920212		
	920211	204343.29	697.	-255.	-1975.	-12.	93455	399
10476	28.98	103.54	-.0031	77 065 EJ	107.75	920211		
	920211	143905.62	338.	-393.	-106.	14.	94733	399
10519	29.06	109.68	-.0013	7711-8 C	158.33	920211		
	920126	220347.36	869.	242.	1097.	11.	88892	398
10541	75.84	103.75	-.0000	77 123 B	356.62	920211		
	920211	061207.43	489.	4.	561.	-5.	93915	396
	920211	061511.19	566.	83.	371.	-4.	93915	396
10569	65.40	105.08	-.0004	77 121 L	85.01	920211		
	920211	073534.40	576.	-198.	1209.	-4.	89812	232
	920211	073559.85	534.	-201.	1070.	-19.	89812	232
10579	65.65	108.27	-.0001	77 121 W	294.86	920212		
	920211	084751.73	615.	-29.	-172.	-7.	89832	232
	920211	084813.75	620.	-28.	-256.	-5.	89832	232
	920211	084836.37	631.	-24.	-344.	-7.	89832	232

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH	TAG	SENSOR
	DATE	TIME	ALT	ΔU	ΔV	ΔW		
	920211	084857.67	646.	-17.	-429.	-13.	89832	232
10599	82.94	104.66	-.0001	78 007 A	345.83	920211		
	920211	061511.19	566.	-10.	-539.	-20.	93915	396
10614	65.73	116.25	-.0001	76 067 AN	224.47	920211		
	920211	000514.37	624.	-330.	-180.	9.	86734	329
10617	65.63	116.50	-.0000	76 067 AK	219.73	920212		
	920211	182910.50	1136.	-1.	0.	2.	10617	396
	920211	182930.24	3136.	-1.	0.	2.	10617	396
	920211	101030.77	745.	-32.	454.	-5.	94714	399
10626	29.18	108.99	-.0010	77 065 EV	305.80	920211		
	920128	233141.60	664.	-304.	-3940.	12.	88892	398
10629	29.83	113.32	-.0003	77 065 EY	291.55	920211		
	920209	024650.96	1012.	-205.	2345.	-20.	15390	398
	920210	235556.63	842.	-117.	1319.	16.	88075	399
10659	102.09	119.17	-.0001	76 077 V	198.34	920212		
	920210	201619.90	974.	122.	448.	15.	82080	222
	920210	223518.82	909.	-137.	-1131.	-12.	90220	395
10718	101.62	116.02	-.0001	76 077 AP	57.54	920211		
	920211	223435.15	708.	-117.	-861.	6.	94750	399
10723	29.66	556.01	-.0595	78 012 C	343.70	920211		
	920211	144012.71	14566.	-4.	-5100.	4.	83999	221
	920211	144034.02	14586.	-3.	-5104.	16.	83999	221
	920211	144053.94	14604.	-3.	-5308.	28.	83999	221
	920211	144114.03	14622.	-3.	-5112.	40.	83999	221
10755	102.42	117.49	-.0000	76 077 3C	7.04	920211		
	920114	202056.60	875.	-270.	-1595.	2.	21692	398
10760	101.40	118.16	.0001	76 077 BH	310.82	920211		
	920211	171158.80	726.	-237.	1447.	-9.	94742	399
10826	102.32	117.32	.0004	76 077 BW	297.55	920211		
	920211	173319.96	958.	82.	269.	-15.	90001	241
	920211	173345.84	918.	49.	174.	-4.	90001	241
	920211	173350.45	912.	44.	159.	-8.	90002	242
	920211	173433.40	863.	1.	2.	8.	90002	242
	920211	173502.61	842.	-19.	-107.	19.	90002	242
10829	101.92	116.60	-.0000	76 077 BZ	310.32	920211		
	920211	103708.06	823.	-69.	770.	0.	89832	231
10837	102.22	119.70	.0000	70 077 CH	193.12	920211		
	920210	223225.69	1010.	65.	-249.	13.	89405	242
10882	65.83	105.23	-.0003	77 121 AD	336.35	920211		
	920211	075245.98	595.	-47.	-1057.	9.	86768	329
10894	64.35	286.65	.0014	78 047 B	257.39	920211		
	920209	023857.23	1795.	594.	-320.	-22.	15390	398
10933	74.03	115.65	-.0000	78 056 0	133.79	920211		
	920211	051730.95	821.	-94.	990.	2.	94699	399
10960	64.35	314.40	.0001	77 053 8	131.71	920231		
	920211	191146.42	784.	47.	1250.	-10.	95222	393

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
10992	82.94	104.59	-.0001	78 074 B	327.77	920211		
	920211	194036.11	547.	26.	36.	-2.	87272	396
11028	31.20	336.39	-.0437	78 087 B	92.11	920116		
	920211	075734.75	2219.	271.	2293.	-41.	89871	231
11080	99.15	104.07	-.0001	78 098 A	302.66	920211		
	920211	095328.07	513.	-18.	360.	9.	89832	232
11145	8.26	1436.15	0.0000	78 113 B	61.32	920211		
	920210	223052.30	19303.	-234.	3130.	-31.	89405	242
	920210	223123.74	19303.	-234.	3129.	-29.	89405	242
	920210	223157.03	19303.	-234.	3129.	-27.	89405	242
	920210	223225.69	19303.	-234.	3129.	-25.	89405	242
	920210	223358.66	19302.	-235.	3129.	-19.	89407	242
	920210	223430.21	19302.	-235.	3129.	-17.	89407	242
	920210	223458.74	19302.	-235.	3129.	-16.	89407	242
	920210	223607.20	19302.	-235.	3129.	-11.	89407	242
	920211	172857.63	19316.	-1.	281.	-12.	90000	241
	920211	172923.67	19316.	-1.	282.	-13.	90000	241
	920211	172952.42	19316.	-1.	282.	-13.	90000	241
	920211	173019.24	19316.	-1.	283.	-13.	90000	241
	920211	173159.75	19315.	-1.	144.	17.	90001	241
	920211	173236.93	19315.	-1.	141.	17.	90001	241
	920211	173319.96	19315.	-1.	138.	17.	90001	241
	920211	173345.84	19315.	-1.	135.	18.	90001	241
	920211	173350.45	19316.	-0.	7.	4.	90002	242
	920211	173433.40	19316.	-0.	7.	4.	90002	242
	920211	173502.61	19316.	-0.	7.	4.	90002	242
	920211	173530.30	19316.	-0.	7.	4.	90002	242
	920211	173616.76	19316.	-0.	6.	4.	90003	241
	920211	173652.59	19316.	-0.	7.	4.	90003	241
	920211	173725.84	19316.	-0.	7.	4.	90003	241
	920211	173743.47	19316.	-0.	7.	4.	89417	242
	920211	173801.52	19316.	-0.	7.	4.	90003	241
	920211	173812.63	19316.	-0.	7.	4.	89417	242
	920211	173841.65	19316.	-0.	7.	4.	89417	242
	920211	173911.53	19316.	-0.	7.	4.	89417	242
	920211	174036.02	19316.	-0.	7.	4.	89417	242
	920211	174100.85	19316.	-0.	7.	4.	89417	242
	920211	174117.68	19317.	-1.	296.	-19.	89415	241
	920211	174127.77	19316.	-0.	7.	4.	89417	242
	920211	174144.50	19317.	-1.	291.	-19.	89415	241
	920211	174154.62	19316.	-6.	7.	4.	89417	242
	920211	174209.95	19317.	-1.	291.	-20.	89415	241
	920211	174235.53	19317.	-1.	291.	-20.	89415	241
	920211	174250.79	19316.	-0.	7.	4.	89417	242
	920211	174354.95	19317.	-1.	262.	-21.	89415	241
	920211	174407.61	19316.	-0.	7.	4.	89417	242
	920211	174419.76	19317.	-1.	293.	-21.	89415	241
	920211	174433.94	19316.	-0.	7.	4.	89417	242
	920211	174443.66	19317.	-1.	293.	-21.	89415	241
	920211	174459.73	19316.	-0.	7.	4.	89417	242
	920211	174508.59	19317.	-1.	293.	-21.	89415	241
	920211	174525.20	19316.	-0.	7.	4.	89417	242
	920211	174633.88	19317.	-1.	294.	-22.	89415	241
	920211	174634.25	19316.	-0.	6.	4.	89417	242
	920211	174701.55	19317.	-1.	295.	-22.	89415	241
	920211	174711.38	19316.	-0.	7.	4.	89417	242
	920211	174726.68	19317.	-1.	295.	-22.	89415	241
	920211	174738.50	19316.	-0.	6.	4.	89417	242
	920211	174751.79	19317.	-1.	295.	-23.	89415	241
	920211	174808.02	19316.	-0.	6.	4.	89417	242

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH		
	DATE	TIME	ALT	ΔU	ΔV	ΔW	TAG	SENSOR
	920211	174913.13	19317.	-1.	296.	-23.	89415	241
	920211	174940.71	19317.	-3.	296.	-24.	89415	241
	920211	175001.63	19335.	-1.	61.	25.	89416	242
	920211	175006.70	19317.	-1.	297.	-24.	89415	241
	920211	175039.33	19317.	-1.	297.	-24.	89415	241
	920211	175040.69	19315.	-1.	58.	25.	89416	242
	920211	175147.94	19315.	-1.	53.	25.	89416	242
	920211	175257.00	19315.	-1.	48.	26.	89416	242
	920211	175401.07	19315.	-3.	43.	26.	89416	242
	920211	175544.14	19315.	-1.	35.	27.	89416	242
	920211	175610.24	19315.	-1.	33.	27.	89416	242
	920211	175641.24	19315.	-1.	30.	27.	89416	242
	920211	175709.66	19315.	-3.	28.	28.	89416	242
	920211	175728.50	19316.	-0.	6.	5.	90004	241
	920211	175758.10	19336.	-0.	6.	4.	90004	241
	920211	175828.40	19336.	-0.	6.	4.	90004	241
	920211	175847.64	19315.	-1.	21.	28.	89416	242
	920211	175859.75	19316.	-0.	6.	4.	90004	241
	920211	175917.69	19315.	-1.	19.	29.	89416	242
	920211	175951.58	19315.	-1.	16.	29.	89416	242
	920211	180017.19	19315.	-1.	14.	29.	89416	242
11269	81.24	95.32	-.0020	79 012 B	252.73	920212		
	920211	020456.34	282.	-257.	-1300.	17.	14362	396
	920211	020506.16	282.	-257.	-1300.	15.	14362	396
	920211	020516.03	282.	-257.	-1299.	13.	14362	396
11332	81.24	95.90	-.0016	79 032 B	181.37	920211		
	920211	091102.01	320.	-0.	-0.	-0.	11332	396
	920211	091111.88	320.	-0.	-0.	-0.	11332	396
11343	10.50	1436.46	0.0000	79 035 A	52.23	920210		
	920210	225629.64	19326.	0.	2.	0.	89415	242
	920210	225706.13	19326.	0.	2.	0.	89415	242
	920210	225738.49	19326.	0.	2.	0.	89415	242
	920210	225805.88	19326.	0.	2.	0.	89415	242
11353	8.20	1436.12	0.0000	79 038 A	57.20	920203		
	920211	195321.20	19314.	-20.	906.	-21.	82082	243
	920211	195345.85	19314.	-20.	906.	-19.	82082	243
	920211	195409.30	19314.	720.	906.	-18.	82082	243
	920211	195434.07	19314.	-20.	906.	-17.	82082	243
	920210	223900.67	19316.	-6.	444.	49.	89409	242
	920210	224108.97	19320.	-1.	361.	-42.	89412	242
	920210	224146.21	19320.	-1.	360.	-47.	89412	242
11622	7.87	1436.16	0.0000	79 098 B	62.23	920210		
	920210	223052.30	19357.	-746.	5868.	44.	89405	242
	920210	223123.74	19357.	-746.	5868.	47.	89405	242
	920210	223157.03	19357.	-746.	5869.	48.	89405	242
	920210	223225.69	19357.	-746.	5868.	50.	89405	242
	920210	223733.02	19383.	-252.	3687.	-36.	89409	242
	920210	223804.25	19383.	-251.	3687.	-43.	89409	242
	920210	223832.15	19383.	-251.	3687.	-47.	89409	242
	920210	224446.40	19382.	-177.	3190.	5.	89413	242
	920210	224519.31	19382.	-177.	3189.	4.	89413	242
	920210	224554.37	19382.	-177.	3189.	3.	89413	242
	920210	224624.95	19382.	-177.	3189.	2.	89413	242
	920210	224923.21	19376.	-54.	2068.	-30.	89416	242
	920210	224954.97	19176.	-54.	2069.	-31.	89416	242
	920210	225040.40	19376.	-54.	2069.	-31.	89416	242
	920210	225117.77	19376.	-54.	2069.	-32.	89416	242
	920210	225302.73	19376.	-54.	2070.	-33.	89417	242

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH		
	DATE	TIME	ALT	ΔU	ΔV	ΔW	TAG	SENSOR
	920210	225336.57	19376.	-54.	2072.	-33.	89417	242
	920210	225410.08	19376.	-54.	2071.	-33.	89417	242
	920210	225448.37	19376.	-54.	2072.	-34.	89417	242
	920210	225947.88	19384.	-175.	3180.	-16.	89413	242
	920210	230020.69	19384.	-175.	3180.	-17.	89413	242
	920210	230113.87	19384.	-174.	3179.	-18.	89413	242
	920210	230142.26	19384.	-174.	3179.	-19.	89413	242
	920210	230244.97	19384.	-174.	3178.	-20.	89413	242
	920210	230314.40	19384.	-174.	3178.	-21.	89413	242
	920210	230347.57	19384.	-174.	3177.	-22.	89413	242
	920210	230431.24	19384.	-174.	3177.	-23.	89413	242
	920210	230559.01	19384.	-174.	3176.	-25.	89413	242
	920210	230640.35	19384.	-173.	3176.	-26.	89413	242
	920210	230710.23	19384.	-173.	3175.	-27.	89413	242
	920210	230740.94	19384.	-173.	3175.	-27.	89413	242
	920210	230912.44	19385.	-173.	3174.	-33.	89413	242
	920210	230946.07	19385.	-173.	3173.	-30.	89413	242
	920210	231016.88	19385.	-173.	3173.	-31.	89413	242
	920210	231048.99	19385.	-173.	3173.	-32.	89413	242
11683	81.22	96.17	-.0015	80 008 B	182.37	920211		
	920124	123835.16	344.	-191.	1235.	-14.	87302	396
	920124	123845.03	344.	-190.	1230.	6.	87302	396
11690	64.50	718.02	-.0001	80 011 A	73.23	920210		
	920211	092047.21	10677.	-440.	1931.	13.	89376	232
	920211	092111.34	10679.	-434.	1908.	21.	89376	232
	920211	092134.88	10681.	-428.	1885.	29.	89376	232
	920211	092159.30	10683.	-423.	1861.	37.	89376	232
11708	9.81	1437.09	0.0000	80 016 A	53.25	920211		
	920210	223052.30	19335.	-318.	3748.	-39.	89405	242
	920210	223123.74	19335.	-318.	3747.	-35.	89405	242
	920210	223157.03	19335.	-318.	3748.	-31.	89405	242
	920210	223225.69	19335.	-318.	3747.	-27.	89405	242
	920210	223356.66	19335.	-318.	3747.	-16.	89407	242
	920210	223430.21	19334.	-318.	3747.	-12.	89407	242
	920210	223458.74	19334.	-318.	3747.	-9.	89407	242
	920210	223607.20	19334.	-319.	3747.	-1.	89407	242
	920210	232056.94	19352.	-13.	1004.	-21.	89413	242
	920210	232721.32	19352.	-13.	1004.	-20.	89413	242
	920210	232742.25	19352.	-13.	1004.	-19.	89413	242
	920210	232803.48	19352.	-13.	1003.	-18.	89413	242
11718	24.45	324.18	-.0228	80 018 2	245.47	920211		
	920119	171545.10	1378.	-177.	-340.	-1.	11718	398
	920119	171712.01	1538.	-179.	-3301	-1.	11718	398
	920119	171847.70	1717.	-180.	-319.	-1.	11718	398
	920119	172022.91	1897.	-179.	-308.	-0.	11718	398
	920119	172158.36	2079.	-179.	-297.	-1.	11718	398
	920119	172334.05	2262.	-179.	-291.	-0.	11718	398
11765	66.11	103.22	-.0020	80 030 A	305.32	920212		
	920211	032423.85	205.	-254.	-473.	8.	86666	329
11791	63.20	217.37	-.0469	80 032 B	16.09	920211		
	920210	201818.77	1731.	195.	2016.	-1.	82080	222
11848	97.69	90.60	-.0538	80 051 A	190.13	920211		
	920211	032935.70	353.	-9.	2.	-9.	90008	329
	920211	032958.30	164.	2.	2.	2.	90000	329
12054	64.99	97.88	-.0027	80 089 A	146.24	920211		

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
	920115	235238.80	430.	-102.	1324.	11.	88904	398
12102	90.30	111.35	-.0000	65 027 G	104.24	920130		
	920113	055312.35	705.	-337.	-1663.	16.	12102	399
	920113	055336.03	705.	-338.	-1664.	16.	12102	399
	920113	055423.11	706.	-338.	-1664.	15.	12102	399
	920113	055509.31	706.	-339.	-1665.	15.	12102	399
	920113	055555.20	706.	-339.	-1667.	15.	12102	399
	920211	075734.75	730.	20.	136.	-5.	89871	231
12120	9.41	1435.61	0.0000	80 104 A	56.46	920209		
	920210	225629.64	19438.	-461.	5194.	49.	89415	242
	920210	225706.13	19438.	-461.	5194.	48.	89415	242
	920210	225738.49	19439.	-461.	5194.	46.	89415	242
	920210	225805.88	19439.	-461.	5194.	45.	89415	242
12139	82.96	105.22	-.0026	81 003 B	290.85	920211		
	920211	175606.24	404.	129.	645.	-8.	93974	396
	920211	175616.11	404.	143.	563.	-6.	93974	396
	920211	175625.98	404.	155.	479.	-4.	93974	396
	920211	175635.85	404.	165.	395.	-1.	93974	396
	920211	175645.72	404.	174.	311.	1.	93974	396
12155	81.17	96.56	-.0005	81 008 B	253.71	920212		
	920211	012736.11	276.	-152.	822.	-0.	93888	396
12165	98.91	102.25	-.0001	78 026 E	18.45	920211		
	920210	195115.32	473.	-5.	237.	6.	89207	221
	920210	195202.62	467.	-3.	44.	17.	89207	221
12166	96.92	102.12	-.0003	78 026 F	22.03	920211		
	920211	043719.26	444.	155.	-975.	6.	86777	329
12179	98.86	103.48	-.0003	78 026 U	288.80	920211		
	920211	153334.38	506.	-98.	-534.	2.	94638	399
12201	98.97	103.87	-.0001	78 026 AS	301.44	920211		
	920211	094615.92	469.	-24.	284.	2.	89832	233
	920211	094655.26	466.	-17.	125.	13.	89832	233
12212	99.11	103.27	-.0002	78 026 BD	343.09	920211		
	920211	124108.50	482.	-19.	-24.	9.	80108	231
12232	98.92	102.18	-.0025	78 026 BZ	320.25	920211		
	920211	003102.63	453.	-327.	-1666.	13.	90000	329
12257	99.07	103.14	-.0003	78 026 DA	337.59	920211		
	920131	192428.77	553.	-3.	-673.	8.	19881	398
12283	98.58	103.30	-.0003	78 026 EC	29.49	920211		
	920210	211850.51	399.	-153.	747.	4.	89298	221
12294	98.39	100.78	-.0001	78 026 EP	50.48	920211		
	920211	064713.93	436.	-163.	1015.	9.	93035	393
12295	28.20	397.18	-.0476	81 012 A	213.39	920208		
	920211	200107.59	11498.	-747.	-7412.	-16.	83421	369
	920211	200156.80	11431.	-861.	-7403.	31.	83421	369
	920211	112917.85	870.	534.	-1285.	47.	94718	399
	920211	112934.68	849.	477.	-1383.	-32.	94718	399
	920211	113622.28	986.	-800.	-3149.	-21.	93878	399
12321	74.03	114.62	.0000	81 022 B	14.75	920212		

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
	920211	131155.08	797.	-65.	936.	-2.	90062	395
12322	74.03	114.78	-.0000	81 022 C	31.55	920211		
	920210	195115.32	766.	-0.	36.	3.	89207	221
	920210	195202.62	786.	18.	-144.	7.	89207	221
12330	65.37	133.99	-.0003	78 014 B	346.55	920211		
	920211	125935.77	239.	-399.	346.	-15.	94139	393
12333	65.86	116.82	-.0000	76 067 AZ	24.33	920212		
	920210	200639.51	734.	145.	551.	-10.	82080	222
12347	66.05	97.43	-.0139	80 030 V	337.19	920211		
	920211	205718.99	459.	98.	-415.	10.	94000	396
12388	82.97	106.30	-.0019	81 033 A	147.22	920211		
	920211	145431.02	320.	-29.	1020.	6.	86799	329
	920211	131534.37	251.	-250.	-1324.	-1.	94145	393
12445	23.66	228.19	-.0059	60 098 B	10.44	920212		
	920208	050819.64	380.	167.	245.	18.	15390	398
12497	23.96	221.00	-.0192	81 050 B	176.07	920211		
	920206	150321.55	1264.	581.	-29.	14.	[illegible]	398
12564	9.06	1436.70	0.0000	81 061 A	57.70	920211		
	920210	192500.81	19330.	-1057.	691[illegible].	-39.	11353	404
	920210	192718.05	19333.	-1052.	6913.	-14.	11353	404
	920210	192935.29	19337.	-1040.	6886.	-0.	11353	404
	920210	193152.53	19331.	-1065.	6950.	-9.	11353	404
	920210	193409.77	19330.	-1064.	6939.	-39.	11353	404
	920210	193627.01	19332.	-1060.	6936.	-21.	11353	404
	920210	194318.73	19333.	-1054.	6916.	-42.	11353	404
12644	74.04	117.49	-.0000	81 074 J	304.91	920211		
	920122	075031.28	786.	-99.	-886.	-19.	88066	398
12677	7.52	1446.49	0.0000	81 076 A	62.16	920203		
	920210	224108.97	19456.	1.	55.	-34.	89412	242
	920210	224146.21	19456.	1.	56.	-40.	89412	242
	920210	224225.01	19456.	2.	56.	-47.	89412	242
	920210	232656.94	19454.	-5.	-356.	40.	89413	242
	920210	232721.32	19454.	-5.	-356.	39.	89413	242
	920210	232742.25	19454.	-5.	-356.	38.	89413	242
	920210	232803.48	19454.	-5.	-356.	38.	89413	242
12694	83.09	106.35	-.0003	61 053 AN	312.98	920211		
	920211	051519.34	516.	-195.	-1209.	17.	18601	399
12698	82.94	103.93	-.0018	81 053 AS	140.69	920211		
	920211	101116.87	482.	-32.	192.	-15.	89813	232
12715	83.12	102.49	-.0010	81 053 EK	105.78	920211		
	920211	224222.40	473.	-109.	980.	-8.	95291	393
	920211	224415.30	473.	-105.	978.	-4.	95291	393
	920211	224607.33	473.	-101.	974.	-0.	95291	393
	920211	224758.63	474.	-96.	971.	3.	95291	393
	920211	224950.13	474.	-92.	966.	6.	95291	393
12720	83.26	105.36	-.0003	81 053 BM	338.52	920211		
	920211	061147.69	490.	-95.	-285.	10.	93915	396
12731	82.94	105.01	-.0006	81 053 BY	173.33	920211		

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH		
	DATE	TIME	ALT	ΔU	ΔV	ΔW	TAG	SENSOR
	920211	194036.11	547.	-208.	-1207.	-11.	87272	396
12733	82.89	103.73	-.0012	81 053 CA	111.90	920211		
	920208	050624.96	500.	-26.	-314.	-17.	15390	398
12736	83.04	106.70	-.0003	81 053 CO	312.10	920211		
	920207	161931.34	586.	-41.	-108.	2.	21538	384
12770	82.86	100.63	-.0017	81 053 DP	273.29	920211		
	920211	081032.68	400.	-302.	-1328.	4.	90000	329
12782	88.00	105.55	-.0002	81 053 DY	234.70	920212		
	920211	075245.98	595.	-352.	1770.	11.	86768	329
12786	82.49	97.38	-.0003	81 062 B	14.26	920211		
	920208	094258.60	326.	-14.	127.	16.	15390	398
12849	82.50	108.26	-.0005	81 094 B	322.99	920211		
	920211	174723.14	494.	3.	-834.	19.	13464	399
12864	65.84	104.69	-.0005	77 121 AS	332.39	920212		
	920211	064807.63	583.	-151.	-1367.	-2.	90000	329
12869	65.79	105.65	-.0005	77 121 AX	115.34	920211		
	920211	051554.33	517.	-343.	1434.	1.	18601	399
12879	82.60	115.92	-.0000	81 098 A	355.63	920211		
	920211	131155.08	797.	-5.	12.	8.	90062	395
12897	8.81	1436.37	0.0000	81 102 A	58.24	920211		
	920210	192609.43	19328.	-277.	-3493.	47.	11353	404
	920210	192826.67	19331.	-281.	-3539.	46.	11353	404
	920210	193043.91	19330.	-279.	-3518.	46.	11353	404
	920210	193301.15	19324.	-281.	-3492.	-12.	11353	404
	920210	193518.39	19323.	-276.	-3457.	5.	11353	404
	920210	193735.63	19328.	-285.	-3545.	-14.	11353	404
	920210	193844.25	19330.	-278.	-3514.	31.	11353	404
	920210	193952.87	19326.	-277.	-3484.	11.	11353	404
	920210	194101.49	19332.	-266.	-3574.	-4.	11353	404
	920210	194210.11	19326.	-273.	-3456.	34.	11353	404
	920210	194427.35	19330.	-279.	-3520.	19.	11353	404
	920210	194535.97	19328.	-274.	-3478.	32.	11353	404
	920210	194644.59	19330.	-273.	-3478.	44.	11353	404
	920210	195657.38	39324.	-277.	-3469.	-32.	11353	404
	920210	195806.00	19328.	-280.	-3521.	-28.	11353	404
	920210	200023.24	19326.	-277.	-3484.	-30.	11353	404
	920210	200131.86	19331.	-276.	-3516.	4.	11353	404
	920210	200240.48	19328.	-279.	-3511.	-37.	11353	404
	920210	200349.10	19328.	-280.	-3515.	-38.	11353	404
	920210	200457.72	19327.	-278.	-3500.	-36.	11353	404
	920210	203832.62	19333.	-274.	-3516.	-46.	11353	404
	920210	223052.30	19347.	4.	-824.	-43.	89405	242
	920210	223123.74	19347.	4.	-824.	-40.	89405	242
	920210	223157.03	19347.	4.	-824.	-37.	89405	242
	920210	223225.69	19347.	3.	-824.	-35.	89405	242
	920210	223358.66	19346.	3.	-824.	-27.	89407	242
	920210	223430.21	19346.	3.	-824.	-24.	89407	242
	920210	223458.74	19346.	3.	-824.	-22.	89407	242
	920210	223607.20	19346.	3.	-824.	-16.	89407	242
12947	83.09	107.88	-.0000	81 053 EB	45.31	920212		
	920201	114549.92	537.	-210.	-1316.	5.	20672	398

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH		
	DATE	TIME	ALT	ΔU	ΔV	ΔW	TAG	SENSOR
12959	63.91	717.62	-.0001	81 113 A	78.27	920211		
	920204	143907.98	2578.	544.	-3877.	-42.	15390	398
	920209	024051.34	1601.	-1414.	3583.	49.	15390	398
12979	73.98	117.11	.0000	81 116 E	247.02	920211		
	920211	144346.45	889.	-205.	-1469.	-13.	90236	383
12987	82.52	97.03	-.0007	81 117 A	68.33	920212		
	920211	051116.85	350.	24.	-32.	16.	89810	232
12993	67.89	727.74	.0017	81 071 E	279.58	920208		
	920211	082926.77	18791.	175.	4065.	8.	89336	232
	920211	083016.70	18770.	173.	4080.	4.	89336	232
	920211	083054.25	18753.	372.	4090.	2.	89336	232
	920211	083121.75	18741.	171.	4096.	-2.	89336	232
	920211	083244.24	16705.	168.	4319.	-9.	89336	232
	920211	083306.92	18695.	167.	4125.	-11.	89336	232
	920211	083330.45	18684.	166.	4132.	-13.	89336	232
	920211	083352.26	18674.	165.	4138	-15.	89336	232
13016	64.09	695.28	-.0021	81 123 D	204.61	920208		
	920210	232656.94	3772.	-139.	1219.	-37.	89413	242
	920210	232721.32	3816.	-132.	1163.	-47.	89413	242
13024	82.94	104.20	-.0010	81 053 EW	143.50	920211		
	920207	161911.26	552.	-12.	685.	16.	21538	384
13073	82.94	105.15	-.0081	81 053 EZ	174.96	920211		
	920211	100014.31	588.	34.	157.	-16.	93937	396
	920211	100024.22	588.	34.	151.	5.	93937	390
13080	67.46	718.90	.0057	82 016 A	222.38	920211		
	920208	215817.34	3708.	-117.	-1171.	-26.	15390	398
13112	64.35	730.91	-.0219	82 023 D	36.69	920211		
	920210	200504.94	2632.	29.	-1429.	-44.	89207	221
	920210	201942.02	3410.	-178.	-5671.	31.	89207	221
	920210	202051.21	3609.	-480.	-6154.	11.	89207	221
	920210	202159.98	3818.	-870.	-6629.	-11.	89207	221
	920210	202258.95	4003.	-1282.	-7020.	-29.	89207	221
13177	8.05	1436.37	0.0000	82 044 A	67.79	920210		
	920211	195321.20	19333.	-1.	4.	21.	82682	243
	920211	195345.85	19333.	-1.	5.	21.	82082	243
	920211	195409.30	19333.	-1.	4.	21.	82082	243
	920211	195434.07	19333.	-1.	5.	21.	82082	243
	920210	225629.64	19329.	-40.	-1370.	-41.	89415	242
	920210	225706.13	19329.	-40.	-1371.	-45.	89415	242
	920210	225738.49	19329.	-40.	-1371.	-48.	89415	242
13269	.01	1436.03	0.0000	82 058 A	336.39	920209		
	920211	085933.98	19403.	65.	-1033.	-16.	90600	951
	920211	085949.03	19403.	65.	-1033.	-16.	90000	951
	920211	090003.68	19403.	65.	-1033.	-16.	90000	951
	920211	090018.48	19403.	65.	-1033.	-16.	90600	951
13390	64.07	697.87	-.0021	82 074 D	36.69	920211		
	920211	083352.26	19814.	-459.	7105.	29.	89336	232
13458	83.10	103.91	-.0004	81 053 FE	182.17	920211		
	920211	060733.76	523.	-32.	625.	-17.	94707	399
13459	83.14	102.49	-.0064	81 053 FF	202.35	920211		

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH		
	DATE	TIME	ALT	ΔU	ΔV	ΔW	TAG	SENSOR
	920211	100402.07	4963.	-11.	293.	13.	93938	396
13464	82.95	104.03	-.1067	81 053 FL	151.58	920210		
	920211	064413.52	535.	-7.	-301.	-0.	13464	399
	920211	064650.14	533.	-7.	-303.	-0.	13464	399
	920211	065548.75	524.	-7.	-305.	-0.	13464	396
	920211	065558.62	5231	-7.	-305.	0.	13464	396
	920211	065608.49	523.	-7.	-305.	-0.	13464	396
	920211	174723.14	494.	-35.	-561.	-1.	13464	399
13503	66.04	116.95	-.0002	76 067 BB	204.29	920231		
	920208	094840.97	710.	96.	432.	-20.	15390	398
13515	65.90	116.48	-.0002	76 067 BC	20.77	920211		
	920210	201818.77	1104.	193.	-1137.	-6.	82080	222
13554	6.09	1435.20	0.0000	82 093 A	59.39	920211		
	920211	195321.20	19408.	-293.	-4191.	16.	82082	243
	920211	195345.85	19408.	-293.	-4190.	17.	82082	243
	920211	195409.30	19408.	-293.	-4191.	18.	82082	243
	920211	195434.07	19408.	-293.	-4190.	19.	82082	243
	920210	223733.02	19433.	-372.	-4535.	6.	89409	242
	920210	223804.25	19434.	-372.	-4535.	2.	89409	242
	920210	223832.15	19434.	-372.	-4535.	-2.	89409	242
	920210	223900.67	19434.	-371.	-4535.	-6.	89409	242
	920210	224923.21	19426.	-762.	-6122.	11.	89416	242
	920210	224954.97	19426.	-762.	-6121.	11.	89416	242
	620210	225040.46	19427.	-761.	-6120.	11.	89416	242
	920210	225117.77	19427.	-761.	-6120.	11.	89416	242
	920210	225302.73	19427.	-761.	-6110.	11.	89417	242
	920210	225336.57	19427.	-761.	-6117.	11.	89417	242
	920210	225410.06	19427.	-761.	-6118.	11.	89417	242
	920210	225448.37	19427.	-761.	-6117.	11.	89417	242
	920210	225947.88	19435.	-482.	-5034.	41.	89413	242
	920210	230020.69	19435.	-482.	-8034.	41.	89413	242
	920210	230113.87	19435.	-482.	-5035.	41.	89413	242
	920210	230142.26	19435.	-482.	-5035.	40.	89413	242
	920210	230244.97	19435.	-482.	-5036.	39.	89413	242
	920210	230314.40	19435.	-462.	-5036.	39.	89413	242
	920210	230347.57	19435.	-482.	-5036.	38.	89413	242
	920210	230433.24	19436.	-482.	-5037.	38.	89413	242
	920210	230559.01	19436.	-482.	-5037.	37.	89413	242
	920210	230640.35	19436.	-482.	-5038.	37.	89413	242
	920210	230710.23	19436.	-482.	-5038.	36.	89413	242
	920210	230740.94	19436.	-483.	-5038.	36.	89413	242
	920210	230912.44	19436.	-483.	-5039.	35.	89413	242
	920210	230946.67	19436.	-483.	-5039.	34.	89413	242
	920210	231016.88	19436.	-483.	-5039.	34.	89413	242
	920210	231048.99	19437.	-483.	-5040.	34.	89413	242
	920210	232656.94	19439.	-485.	-5048.	23.	89413	242
	920210	232721.32	19439.	-485.	-5048.	22.	89413	242
	920210	232742.25	19439.	-485.	-5049.	22.	89413	242
	920210	232803.48	19439.	-485.	-5049.	22.	89413	242
	920211	172857.63	19392.	-495.	-5235.	-14.	90000	241
	920211	172923.67	19392.	-495.	-5235.	-14.	90000	241
	920211	172952.42	19392.	-495.	-5234.	-14.	90000	241
	920211	173019.24	19392.	-494.	-5234.	-14.	90000	241
	920211	173159.75	19391.	-528.	-5371.	16.	90001	241
	920211	173236.93	19391.	-529.	-5373.	16.	90001	241
	920211	173319.95	19391.	-530.	-5377.	17.	90001	241
	920211	173345.84	19391.	-531.	-5379.	18.	90001	241
	920211	173350.45	19392.	-561.	-5504.	4.	90002	242
	920211	173433.40	19392.	-561.	-5505.	4.	96002	242

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
	920211	173502.61	19392.	-561.	-5505.	5.	90002	242
	920211	173530.30	19392.	-561.	-5505.	5.	90002	242
	920211	173616.76	19392.	-561.	-5508.	5.	90003	241
	920211	173652.59	19392.	-561.	-5506.	6.	90003	241
	920211	173725.84	19392.	-561.	-5506.	6.	90003	241
	920211	173743.47	19392.	-561.	-5506.	6.	89417	242
	920211	173801.52	19392.	-562.	-5506.	6.	90003	241
	920211	173812.63	19392.	-562.	-5506.	6.	89417	242
	920211	173841.65	19392.	-562.	-5506.	7.	89417	242
	920211	173911.53	19392.	-562.	-5506.	7.	89417	242
	920211	174036.02	19392.	-562.	-5507.	8.	89417	242
	920211	174100.85	19392.	-562.	-5507.	8.	89417	242
	920211	174117.68	19393.	-494.	-5230.	-14.	89415	241
	920211	174127.77	19393.	-562.	-5507.	3.	89417	242
	920211	174144.50	19393.	-494.	-5230.	-34.	89415	241
	920211	174154.62	19393.	-562.	-5507.	8.	89417	242
	920211	174209.95	19393.	-494.	-5230.	-34.	89415	241
	920211	174235.53	19393.	-494.	-5230.	-14.	89415	241
	920211	174250.79	19393.	-562.	-5507.	9.	89417	242
	920211	174354.95	19394.	-494.	-5229.	-14.	89415	241
	920211	174407.61	19393.	-563.	-5508.	10.	89417	242
	920211	174419.76	19394.	-494.	-5229.	-14.	89415	241
	920211	174433.94	19393.	-563.	-5508.	10.	89417	242
	920211	174443.66	19394.	-494.	-5229.	-14.	89415	241
	920211	174459.73	19393.	-563.	-5508.	10.	89417	242
	920211	174508.59	19394.	-494.	-5229.	-14.	89415	241
	920211	174525.20	19393.	-563.	-5508.	11.	89417	242
	920211	174633.88	19394.	-494.	-5228.	-13.	89415	241
	920211	174634.25	19393.	-563.	-5509.	11.	89417	242
	920211	174701.55	19394.	-494.	-5228.	-14.	89415	241
	920211	174711.38	19393.	-563.	-5509.	11.	89417	242
	920211	174726.68	19394.	-494.	-5228.	-13.	89415	241
	920211	174738.50	19393.	-563.	-5509.	12.	89417	242
	920211	174751.79	19394.	-494.	-5228.	-14.	89415	241
	920211	174808.02	19393.	-563.	-5509.	12.	89417	242
	920211	174913.11	19394.	-494.	-5227.	-13.	89415	241
	920211	174940.71	19394.	-494.	-5227.	-13.	89415	241
	920211	175001.63	19393.	-551.	-5456.	34.	89416	242
	920211	175006.70	19395.	-494.	-5227.	-13.	89415	241
	920211	175039.33	19395.	-494.	-5226.	-13.	89415	241
	920211	175040.69	19393.	-552.	-5460.	35.	89416	242
	920211	175147.94	19393.	-554.	-5465.	35.	89416	242
	920211	175257.00	19393.	-555.	-5470.	37.	89416	242
	920211	175401.07	19393.	-557.	-5476.	38.	89416	242
	920211	175544.14	19393.	-559.	-5484.	39.	89416	242
	920211	175610.24	19393.	-560.	-5486.	40.	89415	242
	920211	175641.24	19393.	-560.	-5488.	40.	89416	242
	920211	175709.66	19393.	-561.	-5490.	41.	89416	242
	920211	175728.50	19394.	-565.	-5513.	18.	90004	241
	920211	175758.10	19394.	-565.	-5513.	18.	90004	241
	920211	175828.40	19394.	-565.	-5513.	18.	90004	241
	920211	175847.64	19393.	-563.	-5498.	42.	89416	242
	920211	175859.75	19394.	-565.	-5513.	18.	90004	241
	920211	175917.69	19393.	-564.	-5500.	43.	89416	242
	920211	175951.58	19393.	-564.	-5503.	43.	89416	242
	920211	180017.19	19393.	-5651	-5505.	44.	89416	242
13562	98.87	101.73	-.0009	78 026 EZ	27.93	920211		
	920211	205738.71	453.	-50.	4582.	5.	94000	396
	920211	205748.59	450.	-65.	-656.	-14.	94000	396
13574	99.03	102.46	-.0005	78 026 FM	10.34	920211		
	920210	200221.59	474.	-15.	42.	12.	82080	222

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH		
	DATE	TIME	ALT	ΔU	ΔV	ΔW	TAG	SENSOR
13609	52.06	309.11	-.0224	82 100 G	82.75	920210		
	920124	052920.50	515.	47.	419.	-40.	12102	385
13648	74.00	100.62	-.0002	82 109 A	115.89	920211		
	920211	091202.36	423.	-8.	6.	-18.	89376	232
13666	23.32	630.91	-.0120	82 110 E	274.94	920207		
	920211	042832.11	17896.	1230.	13332.	7.	2865	369
13738	98.56	96.53	-.0074	82 138 C	267.48	920211		
	920211	121911.27	357.	-31.	402.	-9.	86626	329
13757	82.91	104.65	-.0000	83 001 A	39.23	920212		
	920208	120547.77	544.	-129.	-1019.	12.	21538	398
13780	28.49	157.61	-.0741	83 006 B	99.04	920211		
	920211	131457.86	2877.	-33.	-2819.	20.	80108	334
	920211	035324.88	1892.	-361.	1717.	-1.	94652	399
13798	83.01	105.68	-.0002	81 053 GV	255.75	920231		
	920211	054001.99	612.	59.	85.	11.	89812	232
	920211	054029.14	562.	8.	11.	-1.	89812	232
13814	82.95	103.67	-.0017	81 053 HM	135.67	920211		
	920211	103954.72	475.	-31.	-101.	9.	89632	231
	920211	104037.63	479.	-35.	-271.	-0.	89832	231
	920211	104059.94	494.	-28.	-364.	4.	89832	231
	920213	104125.83	520.	-13.	-478.	14.	89832	231
13815	83.04	106.21	-.0004	81 053 HN	304.33	920211		
	920211	094258.77	609.	65.	414.	4.	89832	233
13878	8.45	1515.35	0.0000	83 016 A	62.26	920209		
	920211	172857.63	20074.	-0.	129.	-10.	90000	241
	920211	172923.67	20074.	-0.	132.	-11.	90000	241
	920211	172952.42	20074.	-0.	134.	-11.	90000	241
	920211	173019.24	20074.	-0.	137.	-12.	90000	241
	920211	173159.75	20073.	-1.	0.	20.	90001	241
	920211	173236.93	20073.	-1.	1.	19.	90001	241
	920211	173319.96	20073.	-1.	1.	20.	90001	241
	920211	173345.84	20073.	-1.	1.	20.	90001	241
	920211	173350.45	20074.	-1.	-133.	6.	90002	242
	920211	173433.40	20074.	-1.	-129.	6.	90002	242
	920211	173502.61	20074.	-1.	-127.	6.	90002	242
	920211	173530.30	20074.	-1.	-125.	6.	90002	242
	920211	173616.76	20074.	-1.	-322.	6.	90003	241
	920211	173652.59	20073.	-0.	-119.	5.	89417	241
	920211	173725.84	20073.	-0.	-116.	5.	90003	241
	920211	173743.47	20073.	-0.	-114.	5.	89417	242
	920211	173801.52	20073.	-0.	-113.	5.	90003	241
	920211	173812.63	20073.	-0.	-112.	5.	89417	242
	920211	173841.02	20073.	-0.	-110.	5.	89417	242
	920211	173911.85	20073.	-0.	-107.	5.	89417	242
	920211	174036.02	20073.	-0.	-101.	4.	89417	242
	920211	174100.85	20073.	-0.	-99.	4.	89417	242
	920211	174117.68	20074.	-0.	197.	-21.	89415	241
	920211	174127.77	20073.	-0.	-97.	4.	89417	242
	920211	174144.50	20074.	-0.	200.	-22.	89415	241
	920211	174154.62	20073.	-0.	-95.	4.	89417	242
	920211	174209.95	20074.	-0.	202.	-22.	89415	241
	920211	174235.53	20074.	-0.	205.	-23.	89415	241
	920211	174250.79	20073.	-0.	-90.	3.	89417	242
	920211	174354.95	20074.	-0.	212.	-24.	89415	242

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
	920211	174407.61	20073.	-0.	-84.	3.	89417	242
	920211	174419.76	20074.	-0.	214.	-24.	89415	241
	920211	174433.94	20073.	-0.	-82.	3.	89417	242
	920211	174443.66	20074.	-0.	216.	-25.	89415	241
	920211	174459.73	20073.	-0.	-80.	3.	89417	241
	920211	174508.59	20074.	-0.	219.	-25.	89415	241
	920211	174525.20	20073.	-0.	-78.	3.	89417	241
	920211	174633.88	20074.	-0.	226.	-26.	89415	241
	920211	174634.25	20073.	-0.	-72.	2.	89417	242
	920211	174701.55	20074.	-0.	229.	-27.	89415	241
	920211	174711.38	20073.	-0.	-69.	2.	89417	242
	920213	174726.68	20074.	-0.	231.	-27.	89415	241
	920211	174738.50	20073.	-0.	-67.	2.	89417	242
	920211	174751.79	20074.	-0.	234.	-28.	89415	241
	920211	174808.02	20073.	-0.	-65.	2.	89417	241
	920211	174913.11	20074.	-0.	241.	-29.	89415	241
	920211	174940.71	20074.	-0.	243.	-29.	89415	241
	920211	175001.63	20072.	-1.	1.	22.	89416	242
	920211	175006.70	20074.	-0.	246.	-29.	89415	242
	920211	175039.33	20074.	-0.	249.	-30.	89415	241
	920211	175040.69	20072.	-1.	1.	22.	89416	242
	920211	175147.94	20072.	-1.	1.	22.	89416	242
	920211	175257.00	20072.	-1.	3.	22.	89416	242
	920211	175401.07	20072.	-1.	1.	22.	89416	242
	920211	175544.14	20072.	-1.	1.	23.	89416	242
	920211	175610.24	20072.	-1.	1.	23.	89416	242
	920211	175641.24	20072.	-1.	3.	23.	89416	242
	920211	175709.66	20072.	-1.	1.	23.	89416	242
	920211	175728.50	20073.	0.	-21.	-3.	90004	241
	920211	175758.10	20073.	0.	-19.	-2.	90004	241
	920211	175828.40	20073.	0.	-16.	-2.	90004	241
	920211	175847.64	20072.	-1.	1.	23.	89416	242
	920211	175859.75	20073.	0.	-14.	-2.	90004	241
	920211	175917.69	20072.	-1.	1.	23.	89416	242
	920211	175951.58	20072.	-1.	1.	23.	89416	242
	920211	180017.19	20072.	-1.	1.	23.	89416	242
13904	27.55	415.79	-.0559	67 001 Y	127.27	920210		
	920211	135826.02	11962.	-39.	-1959.	-9.	89298	243
	920211	185858.68	11945.	-38.	-1965.	-26.	89298	243
	920211	185926.40	11930.	-37.	-1970.	-40.	89298	243
13905	23.51	136.45	-.1847	67 001 Z	118.49	920211		
	920211	133825.31	1431.	-138.	-911.	8.	94730	399
13907	24.34	340.76	-.0249	67 001 AB	193.36	920211		
	920210	223123.74	3018.	838.	-4285.	-42.	89405	242
	920210	223157.03	3163.	750.	-4546.	-37.	89405	242
	920210	223225.69	3287.	665.	-4770.	-32.	89405	242
	920210	223358.66	3661.	335.	-5477.	20.	89407	242
	920210	223430.21	3833.	206.	-5710.	-16.	89407	242
	920210	223458.74	3930.	83.	-5917.	-13.	89407	242
13911	27.95	392.62	-.0191	67 001 AF	311.16	920210		
	920211	083534.22	1800.	-37.	-79.	-3.	90000	232
13971	25.95	530.41	-.0649	83 026 D	57.83	920211		
	920210	211939.45	2786.	-1161.	-2526.	-39.	89298	221
14034	60.91	717.34	.0061	83 038 A	139.79	920211		
	920211	030543.80	10306.	-1083.	12069.	49.	21854	369
	920211	030608.03	10306.	-1057.	12031.	47.	21854	369
	920211	030639.20	10306.	-1027.	11984.	43.	21854	369

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
	920211	030710.23	10306.	-999.	11938.	41.	21854	369
	920211	030741.14	10306.	-973.	11891.	38.	21854	369
	920211	030819.11	10306.	-944.	11835.	34.	21854	369
	920211	030910.93	10306.	-907.	11752.	28.	21854	369
	920211	031003.22	10306.	-883.	11688.	23.	21854	369
	920211	031034.16	10306.	-870.	11645.	19.	21854	369
	920211	031105.07	10306.	-858.	11604.	16.	21854	369
	920211	031136.06	10306.	-848.	11563.	13.	21854	369
14086	6.01	1424.37	0.0000	83 016 F	59.80	920210		
	920211	195321.20	19214.	-27.	999.	33.	82082	243
	920211	195345.85	192141	-27.	999.	34.	82082	243
	920211	195409.30	19214.	-27.	998.	35.	82082	243
	920211	195434.07	19214.	-27.	998.	36.	82082	243
	920210	223733.02	19235.	-50.	1625.	3.	89409	242
	920210	223804.25	19235.	-50.	1625.	-1.	89409	242
	920210	223832.15	19235.	-50.	1525.	-5.	89409	242
	920210	223900.67	19235.	-49.	1624.	-9.	89409	242
	920210	224446.40	19232.	-22.	1122.	47.	89413	242
	920210	224519.31	19232.	-22.	1121.	47.	89413	242
	920210	224554.37	19233.	-22.	1120.	40.	89413	242
	920210	224624.95	19233.	-22.	1120.	46.	89413	242
	920210	224923.21	19226.	-0.	-1.	8.	89416	242
	920210	224954.97	19226.	-0.	-1.	8.	89416	242
	920210	225040.46	19226.	-0.	-1.	8.	89416	242
	920210	225117.77	19220.	-0.	-1.	8.	89416	242
	920210	225302.73	19226.	-0.	-1.	8.	89417	242
	920210	225336.57	19226.	-0.	0.	8.	89417	242
	920210	225410.08	19226.	-0.	-1.	8.	89417	242
	920210	225448.37	19226.	-0.	-1.	8.	89417	242
	920210	225947.88	19233.	-20.	1102.	35.	89413	242
	920210	230020.69	19233.	-20.	1101.	35.	89413	242
	920210	230113.87	19233.	-20.	1100.	34.	89413	242
	920210	230142.26	19233.	-20.	1009.	34.	89413	242
	920210	230244.97	19233.	-20.	1098.	33.	89413	242
	920210	230314.40	19233.	-20.	1097.	33.	89413	242
	920210	230347.57	19233.	-20.	1096.	32.	89413	242
	920210	230431.24	19233.	-20.	1095.	31.	89413	242
	920210	230559.01	19233.	-20.	1093.	30.	89413	242
	920210	230640.35	19233.	-19.	1093.	30.	89413	242
	920210	230710.23	19233.	-19.	1092.	29.	89413	242
	920210	230740.94	19233.	-19.	1091.	29.	89413	242
	920210	230912.44	19233.	-19.	1089.	27.	89413	242
	920210	230946.67	19233.	-19.	1088.	27.	89413	242
	920210	231016.88	19233.	-19.	1088.	27.	89413	242
	920210	231048.99	19233.	-19.	1087.	26.	89413	242
	920210	232656.94	19234.	-17.	1064.	13.	85413	242
	920210	232721.32	19234.	-17.	1064.	13.	89413	242
	920210	232742.25	19234.	-17.	1063.	13.	89413	242
	920210	232803.48	19234.	-17.	1063.	12.	89413	242
	920211	172857.63	19203.	-1.	7.	14.	90000	241
	920211	172952.42	19203.	-1.	8.	13.	90000	241
	920211	173019.24	19203.	-1.	8.	13.	90000	241
	920211	173159.75	19202.	-2.	-132.	44.	90001	241
	920211	173236.93	19202.	-2.	-135.	44.	90001	241
	920211	173319.96	19202.	-2.	-339.	45.	90001	241
	920211	173345.84	19202.	-2.	-141.	45.	90001	241
	920211	173356.45	19203.	-3.	-269.	31.	90002	242
	920211	173433.40	19203.	-3.	-269.	31.	90002	242
	920211	173502.61	19203.	-3.	-270.	32.	90002	242
	920211	173530.30	19203.	-3.	-270.	32.	90002	242
	920211	173616.76	19203.	-3.	-271.	33.	90003	241
	920211	173652.59	19203.	-3.	-272.	33.	90003	241

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
	920211	173725.84	19203.	-3.	-272.	33.	90003	241
	920211	173743.47	19203.	-3.	-272.	33.	89417	242
	920211	173801.52	19203.	-3.	-272.	33.	90003	241
	920211	173812.63	19203.	-3.	-272.	33.	89417	242
	920211	173841.65	19204.	-3.	-273.	34.	89417	242
	920211	173911.53	19204.	-3.	-273.	34.	89417	242
	920211	174036.02	19204.	-3.	-274.	35.	89417	242
	920211	174100.85	19204.	-3.	-274.	35.	89417	242
	920211	174117.68	19205.	-1.	8.	14.	89415	241
	920211	174127.77	19204.	-3.	-275.	35.	89417	242
	920211	174144.50	19205.	-1.	8.	14.	89415	241
	920211	174154.62	19204.	-3.	-275.	35.	89417	242
	920211	174209.95	19205.	-1.	8.	14.	89415	241
	920211	174235.53	19205.	-1.	8.	14.	89415	241
	920211	174250.79	19204.	-3.	-276.	38.	89417	242
	920211	174354.95	19205.	-1.	8.	14.	89415	241
	920211	174407.61	19204.	-3.	-277.	37.	89417	242
	920211	174416.76	19205.	-1.	8.	13.	89415	241
	920211	174433.94	19204.	-3.	-277.	37.	89417	242
	920211	174443.66	19205.	-1.	8.	14.	89415	241
	920211	174459.73	19204.	-3.	-277.	37.	89417	242
	920211	174508.59	19205.	-1.	8.	13.	89415	241
	920211	174525.20	19204.	-3.	-278.	38.	89417	242
	920211	174633.88	19205.	-1.	8.	14.	89415	241
	920211	174634.25	19204.	-3.	-278.	38.	89417	242
	920211	174701.55	19205.	-1.	8.	13.	89415	241
	920211	174711.38	19204.	-3.	-279.	38.	89417	242
	920211	174726.68	19205.	-1.	8.	14.	89415	241
	920211	174738.50	19204.	-3.	-279.	39.	89417	242
	920211	174751.79	19205.	-1.	8.	13.	89415	241
	920211	174808.02	19204.	-3.	-279.	39.	89417	242
	920211	174913.11	19205.	-1.	8.	14.	89415	241
	920211	174940.73	19206.	-1.	8.	14.	89415	241
	920211	175006.70	19206.	-1.	8.	14.	89415	241
	920211	175039.33	19206.	-1.	8.	14.	89415	241
	920211	175728.50	19205.	-4.	-287.	44.	90004	241
	920211	175758.10	19205.	-4.	-287.	44.	90004	241
	920211	175828.40	39205.	-4.	-287.	45.	90004	241
	920211	175859.75	19205.	-4.	-287.	45.	90004	241
14096	72.31	119.11	.0000	83 051 B	79.77	920211		
	920211	064649.66	443.	7.	-155.	1.	89871	231
14131	63.22	247.78	-.0047	81 088 G	45.80	920211		
	920129	235803.60	683.	127.	798.	-15.	88788	398
	920211	052037.05	566.	-185.	333.	-30.	89324	232
	920211	052102.97	606.	-163.	264.	-15.	89324	232
	920211	052128.54	652.	-137.	199.	-4.	89324.	232
14136	25.31	623.69	-.0308	83 059 E	207.34	920210		
	920131	234103.31	886.	-904.	3336.	-5.	88032	398
	920131	234134.18	841.	-908.	3263.	49.	88032	398
14167	46.52	177.10	-.1114	83 066 E	296.87	920212		
	920211	093948.48	3777.	-131.	-703.	-26.	89832	232
	920211	094011.52	3764.	-135.	-743.	-14.	89832	232
14176	74.02	115.38	-.0000	83 069 F	97.52	920211		
	920211	191315.07	780.	-27.	-316.	-5.	95222	393
14195	8.79	1436.60	0.0000	81 102 F	58.16	920211		
	920211	103954.72	19169.	-219.	-1670.	41.	89832	231
	920211	104037.63	19168.	-219.	-1664.	19.	89832	231

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH	TAG	SENSOR
	DATE	TIME	ALT	ΔU	ΔV	ΔW		
	920211	104059.94	19168.	-218.	-1660.	8.	89832	231
	920211	104125.83	19168.	-218.	-1656.	-6.	89832	231
	920211	104155.42	19108.	-213.	-1652.	-19.	89832	231
14236	22.73	224.61	-.0475	63 077 C	96.03	920211		
	920211	055928.29	124.	-134.	-675.	-20.	94700	399
14240	74.06	100.62	-.0001	83 070 A	257.76	920212		
	920211	053905.00	422.	-4.	5.	15.	89812	232
14356	82.80	98.88	-.0085	81 053 HS	247.60	920211		
	920211	052037.05	341.	-146.	-867.	5.	89324	232
	920211	052102.97	389.	-138.	-1033.	19.	89324	232
14362	82.83	95.52	-.0501	81 053 HY	253.89	920209		
	920211	020456.34	282.	-8.	249.	1.	14362	396
	920211	020506.16	282.	-8.	249.	1.	14362	396
	920211	020516.03	282.	-8.	249.	1.	14362	396
	920211	124613.90	291.	-16.	313.	-1.	14362	399
	920211	124626.53	291.	-16.	313.	-0.	14362	399
	920211	124642.45	291.	-15.	333.	-0.	14362	399
	920211	124656.10	291.	-16.	313.	-0.	14362	399
14401	74.05	100.73	-.0001	83 103 A	276.39	920212		
	920211	154301.95	418.	-183.	-1129.	8.	19261	399
	920211	154334.42	418.	-183.	-1129.	8.	19261	399
	920211	154408.01	418.	-182.	-1128.	8.	19261	399
	920211	154412.62	417.	-183.	-1127.	8.	19261	399
14410	62.22	110.08	-.0031	68 091 CL	56.51	920212		
	920211	095954.57	589.	170.	570.	-18.	93937	396
	920211	100004.44	588.	179.	496.	6.	93937	396
14416	68.22	107.85	-.0067	68 091 CS	185.77	920210		
	920128	233002.62	808.	-333.	-2013.	-16.	88892	398
14420	62.28	105.04	-.0034	68 097 EB	8.62	920212		
	920210	224225.01	819.	315.	-1050.	-19.	89412	242
14445	66.48	104.80	-.0016	77 121 BH	254.19	920211		
	920211	004827.72	523.	-261.	1221.	-13.	81575	399
14467	99.95	106.12	-.0004	70 025 NT	130.61	920211		
	920211	184253.95	571.	-343.	-1636.	-14.	93983	396
14478	100.56	120.12	-.0035	70 025 NW	138.46	920211		
	920211	091049.88	1023.	4.	-16.	-14.	89376	232
14483	82.92	107.28	-.0017	83 111 A	321.21	920211		
	920211	121911.27	357.	-50.	-1102.	-14.	86626	329
	920211	103954.72	376.	142.	399.	11.	89832	231
14496	29.20	108.70	-.0059	77 065 FM	359.95	920212		
	920211	083016.70	371.	-76.	-121.	-8.	89336	232
	920211	083244.24	383.	-154.	-684.	1.	89336	232
14501	65.78	107.93	-.0082	76 126 BN	160.67	920211		
	920211	000514.37	624.	-167.	820.	-5.	86734	329
14503	65.86	117.63	-.0005	76 126 80	195.15	920211		
	920128	114546.87	1006.	13.	-1719.	18.	21223	383
	920211	090537.90	1089.	-48.	-2134.	-8.	90436	385

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
14512	65.74	133.79	-.0000	77 012 K	36.36	920109		
	920211	094315.63	1223.	-272.	-2591.	10.	89376	232
14514	109.94	105.08	-.0309	76 039 D	344.77	920211		
	920211	215722.80	522.	271.	594.	11.	95283	393
	920211	215900.43	514.	276.	-246.	5.	95283	393
	920211	220036.70	507.	106.	-1056.	1.	95283	393
	920211	220213.80	500.	-232.	-1818.	-4.	95283	393
14515	90.29	111.34	-.0001	65 027 M	103.15	920211		
	920211	033825.09	712.	-222.	-1368.	3.	93901	396
	920211	033834.96	711.	-222.	-1368.	3.	93901	396
	920211	033844.86	711.	-222.	-1368.	3.	93901	396
	920211	033854.70	711.	-222.	-1368.	3.	93901	396
	920211	033904.59	711.	-222.	-1368.	3.	93901	396
14524	23.98	566.51	-.0404	83 089 C	142.70	920211		
	920211	110935.35	337.	93.	-561.	-29.	94716	399
	920211	110959.58	344.	82.	-571.	-4.	94716	399
	920211	111025.10	353.	71.	-582.	22.	94716	399
14528	29.57	106.37	[illegible]	63 047 Q	165.29	920211		
	920211	131850.0[illegible]	809.	-268.	2350.	19.	90233	383
	920211	13190[illegible]	827.	-249.	2353.	-8.	90233	383
14555	83.10	1[illegible].46	-.0053	81 053 JN	32.91	920211		
	920211	[illegible]94610.19	423.	-47.	733.	5.	86622	329
14556	83.[illegible]2	106.64	-.0007	81 053 JP	314.63	920211		
	920211	171336.64	585.	-320.	1696.	16.	94742	399
14557	62.82	104.44	-.0014	81 053 JO	126.59	920211		
	920211	051519.34	516.	-67.	-645.	-1.	18601	399
	920211	051523.71	516.	-67.	-645.	-1.	18601	399
	920211	051538.43	517.	-67.	-644.	-1.	18601	399
	920211	051554.33	517.	-67.	-644.	-1.	18601	399
	920211	051609.32	517.	-67.	-643.	-1.	18601	399
14565	29.21	117.09	-.0002	77 065 FR	254.59	920211		
	920211	133658.51	1269.	-404.	3020.	21.	94730	399
14568	62.90	103.50	-.0013	83 001 C	12.74	920211		
	920210	224624.95	523.	19.	66.	16.	89413	242
14590	66.35	675.74	.0003	83 127 A	19.64	920210		
	920210	223358.66	10331.	-668.	-4332.	-39.	89407	242
	920210	223430.21	10333.	-083.	-4363.	-11.	89407	242
	920210	223458.74	10335.	-697.	-4429.	15.	89407	242
14591	66.36	675.73	.0000	83 127 B	19.63	920210		
	920210	223358.66	10385.	-807.	-4825.	-34.	89407	242
	920210	223430.21	10387.	-823.	-4876.	-6.	89407	242
	920210	223458.74	10390.	-838.	-4922.	20.	89407	242
14608	51.60	331.72	-.0093	83 127 H	230.89	920211		
	920211	050948.16	1027.	451.	1764.	37.	89376	232
14618	74.01	115.69	-.0000	84 001 H	117.00	920211		
	920211	172857.63	827.	-20.	506.	19.	90000	241
	920211	172923.67	807.	-29.	402.	10.	90000	241
	920211	172952.42	795.	-32.	292.	0.	90000	241
	920211	173019.24	793.	-28.	192.	-8.	90000	241

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH		
	DATE	TIME	ALT	ΔU	ΔV	ΔW	TAG	SENSOR
14621	88.91	398.26	.0016	81 070 K	140.96	920203		
	920211	142857.40	285.	-24.	477.	0.	94155	393
14624	82.93	105.00	-.0000	84 003 A	34.38	920212		
	920210	211804.49	513.	-45.	358.	6.	89298	221
	920210	211850.51	517.	-29.	181.	11.	89298	221
	920210	211939.45	538.	-5.	-3.	-4.	89298	221
14665	28.25	152.13	-.3904	84 005 C	220.89	920211		
	920211	220610.58	276.	8.	-15.	-1.	90251	382
14693	28.15	96.04	-.0026	84 011 E	244.12	920211		
	920131	052028.33	445.	-287.	-2049.	8.	88788	398
14694	27.68	98.11	-.0013	84 011 F	273.60	920211		
	920211	202057.32	264.	-220.	-500.	17.	90249	383
	920211	220612.01	268.	-345.	838.	8.	94745	399
14699	82.54	97.16	-.0004	84 013 A	125.10	920211		
	920211	095438.82	354.	18.	68.	13.	89832	232
14715	90.29	111.42	.0001	65 027 N	101.40	920211		
	920211	073534.40	699.	-267.	1443.	7.	89812	232
14783	6.77	1438.20	0.0000	84 022 A	73.75	920211		
	920210	223052.30	19336.	-0.	4.	7.	89405	242
	920210	223123.74	19336.	-0.	4.	8.	89405	242
	920210	223157.03	19336.	-0.	4.	7.	89405	242
	920210	223225.69	19336.	-0.	4.	7.	89405	242
	920210	223358.66	19336.	-0.	4.	7.	89407	242
	920210	223430.21	19336.	-0.	4.	7.	89407	242
	920210	223458.74	19336.	-0.	4.	7.	89407	242
	920210	223607.20	19336.	-0.	4.	7.	89407	242
	920210	223733.02	19362.	-84.	-2231.	-25.	89409	242
	920210	223804.25	19362.	-83.	-2231.	-32.	89409	242
	920210	223832.15	19362.	-83.	-2231.	-38.	89409	242
	920210	223900.67	19363.	-83.	-2232.	-44.	89409	242
	920210	224446.40	19361.	-140.	-2729.	11.	89413	242
	920210	224519.31	19361.	-139.	-2729.	8.	89413	242
	920210	224554.37	19361.	-139.	-2729.	5.	89413	242
	920210	224624.95	19361.	-139.	-2730.	3.	89413	242
	920210	224923.21	19355.	-308.	-3344.	-3.	89416	242
	920210	224954.97	19355.	-308.	-3844.	-5.	89416	242
	920210	225040.46	19355.	-308.	-3343.	-8.	89416	242
	920210	225117.77	19355.	-308.	-3843.	-11.	89416	242
	920210	225302.73	19355.	-307.	-3842.	-17.	89417	242
	920210	225336.57	19355.	-307.	-3841.	-19.	89417	242
	920210	225410.08	19355.	-307.	-3843.	-21.	89417	242
	920210	225448.37	19355.	-307.	-3841.	-24.	89417	242
14825	64.76	717.28	.0057	84 029 A	105.38	920209		
	920211	120805.44	5174.	198.	3236.	41.	83999	222
	920211	120844.16	5212.	191.	3149.	11.	83999	222
14839	28.99	122.08	-.0005	77 065 FS	92.11	920211		
	920211	051618.88	792.	-236.	467.	12.	94699	399
14900	30.48	624.88	-.0065	84 035 8	83.45	920211		
	920211	120229.50	3922.	-17.	283.	-12.	83999	222
14909	98.73	105.57	-.0018	78 026 GJ	50.53	920212		
	920211	223247.69	623.	-235.	-1638.	0.	90462	385

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH		
	DATE	TIME	ALT	ΔU	ΔV	ΔW	TAG	SENSOR
14910	99.06	102.52	-.0009	78 026 GK	2.07	920211		
	920211	100130.79	493.	-386.	1733.	-13.	93938	396
14913	98.95	102.09	-.0009	78 026 GN	29.11	920231		
	920211	205758.46	447.	-78.	-432.	10.	94000	396
14925	82.88	103.87	-.0014	81 053 KA	107.51	920211		
	920211	031835.67	493.	-47.	-371.	-12.	94687	399
14978	66.33	675.74	.0004	84 047 B	19.55	920210		
	920210	223358.66	10277.	-232.	-22.	-22.	89407	242
	920210	223430.21	10276.	-242.	-2335.	6.	89407	242
	920210	223458.74	10275.	-251.	-2382.	31.	89407	242
	920210	225947.88	10356.	-1070.	-5420.	44.	89413	242
15027	65.97	717.57	0.0000	84 055 A	141.57	920211		
	920211	041331.80	10316.	-1233.	10244.	-2.	21854	404
	920211	041412.94	10313.	-1269.	10212.	4.	21854	404
	920211	041454.07	10317.	-1318.	10202.	-21.	21854	404
	920211	041535.20	10316.	-1360.	10178.	-20.	21854	404
	920211	041616.34	10315.	-1393.	10146.	-39.	21854	404
15053	52.14	333.00	-.0061	84 647 G	2.05	920211		
	920211	130111.60	239.	-784.	1197.	30.	94139	393
15054	51.99	314.38	-.0201	84 047 H	310.71	920210		
	920211	123751.07	3533.	518.	1455.	5.	88629	334
15157	28.79	235.67	-.1178	84 080 C	240.28	920211		
	920206	142740.82	1911.	-101.	-1333.	9.	15390	398
15166	7.12	597.98	-.0002	84 081 D	303.68	920209		
	920211	180123.28	18216.	-683.	11173.	-50.	83410	369
	920211	180123.26	18216.	-663.	11173.	-50.	83421	369
	920211	180316.94	18166.	-786.	11118.	-15.	83410	369
	920211	180316.94	18166.	-786.	11118.	-15.	83421	369
	920211	180510.43	18116.	-887.	11060.	22.	83410	369
	920211	180510.43	18116.	-887.	11060.	22.	83421	369
15205	28.73	132.91	-.0004	84 088 E	73.31	920211		
	920211	102223.01	865.	298.	189.	-21.	94491	399
15206	26.91	921.56	0.0000	84 088 F	125.50	911209		
	920210	195115.32	16474.	36.	1727.	24.	89207	221
	920210	195202.62	16533.	36.	1722.	22.	89207	221
	920210	195250.54	16592.	35.	1716.	21.	89207	221
	920210	195337.45	16650.	36.	1711.	20.	89207	221
	920210	195530.57	16786.	37.	1668.	16.	89207	221
	920210	195619.21	16847.	37.	1692.	15.	89207	221
	920210	195818.76	16991.	37.	1678.	12.	89207	221
	920210	195928.38	17074.	37.	1569.	10.	89207	221
	920210	200204.24	17259.	38.	1653.	6.	89207	221
	920210	200301.26	17326.	38.	1646.	4.	89207	221
	920210	200400.54	17396.	38.	1640.	3.	89207	221
	920210	200504.94	17471.	38.	1634.	0.	89207	221
	920210	201942.02	18453.	41.	1548.	-22.	89207	221
	920210	202051.21	16527.	41.	1541.	-25.	89207	221
	920210	202159.98	18601.	41.	1534.	-26.	89207	221
	920210	202258.95	18663.	41.	1529.	-28.	89207	221
	920211	085933.98	2196.	-377.	2942.	-42.	90000	951
	920211	085949.03	2198.	-380.	2893.	-45.	90000	951
	920211	090003.68	2200.	-383.	2846.	-49.	90000	951

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH		
	DATE	TIME	ALT	ΔU	ΔV	ΔW	TAG	SENSOR
15214	63.87	735.25	-.0096	84 089 A	69.50	920211		
	920205	121901.77	1863.	-987.	-1274.	-45.	15390	398
15246	24.91	642.17	-.0295	84 093 G	106.94	920210		
	920211	175641.24	17309.	-750.	-6535.	40.	89416	242
	920211	175709.66	17289.	-746.	-6519.	26.	89416	242
	920211	175728.50	17277.	-750.	-6532.	3.	90004	241
	920211	175758.10	17256.	-745.	-6513.	-14.	90004	241
	920211	175828.40	17234.	-740.	-6495.	-30.	90004	241
	920211	175847.64	17220.	-732.	-6464.	-26.	89416	242
	920211	175859.75	17212.	-735.	-6475.	-48.	90004	241
	920211	175917.69	17198.	-728.	-6447.	-41.	89416	242
15267	67.64	718.21	-.0068	84 096 A	311.52	920210		
	920211	050842.67	19424.	-1244.	6868.	31.	89376	232
15340	90.29	111.34	.0001	65 027 R	103.00	920211		
	920211	082926.77	670.	-373.	1627.	-7.	89336	232
15378	64.99	104.11	-.0000	84 112 A	123.98	920211		
	920131	192504.28	502.	-93.	863.	-12.	19881	398
	920131	192511.63	493.	-104.	869.	-8.	19881	398
	920131	192519.13	483.	-115.	874.	-5.	19881	398
15390	27.07	261.42	-.0068	84 113 E	77.62	920202		
	920204	143150.82	1831.	18.	41.	0.	15390	398
	920204	143311.92	1971.	18.	40.	1.	15390	398
	920204	143440.96	2123.	17.	41.	-1.	15390	398
	920204	143609.11	2274.	17.	39.	-1.	15390	398
	920204	143739.51	2428.	17.	38.	-1.	15390	398
	920204	143907.98	2578.	16.	37.	-1.	15390	398
	920204	220712.12	3829.	-22.	39.	-3.	15390	398
	920204	220752.68	3770.	-20.	31.	1.	15390	398
	920204	220811.06	3743.	-20.	37.	2.	15390	398
	920205	025047.47	1640.	-25.	57.	0.	15390	398
	920205	025219.91	1483.	-26.	57.	0.	15390	398
	920205	025353.20	1327.	-25.	59.	-0.	15390	398
	920205	025553.06	1132.	-25.	62.	-0.	15390	398
	920205	025753.48	945.	-23.	64.	-0.	15390	398
	920205	025953.06	770.	-21.	66.	0.	15390	398
	920205	120903.59	882.	25.	82.	-1.	15390	398
	920205	121100.27	1061.	28.	78.	-0.	15390	398
	920205	121300.22	1253.	29.	76.	-0.	15390	398
	920205	121500.09	1452.	30.	73.	0.	15390	398
	920205	121700.69	1655.	30.	71.	-0.	15390	398
	920205	121901.77	1863.	30.	69.	-0.	15390	398
	920206	050941.81	638.	-35.	116.	0.	15390	398
	920206	094834.08	347.	21.	137.	-0.	15390	398
	920206	094932.81	402.	24.	135.	-0.	15390	398
	920206	095035.66	467.	27.	133.	-0.	15390	398
	920206	095138.79	540.	29.	131.	-0.	15390	398
	920206	095242.03	618.	32.	128.	-0.	15390	398
	920206	095345.03	700.	34.	126.	0.	15390	398
	920206	142622.62	1776.	47.	109.	-2.	15390	398
	920206	142740.82	1911.	46.	107.	-2.	15390	398
	920206	142907.99	2061.	48.	105.	-1.	15390	398
	920206	143035.10	2210.	48.	101.	-2.	15390	398
	920206	143201.50	2359.	49.	98.	-1.	15390	398
	920206	143330.85	2511.	48.	98.	-1.	15390	398
	920207	072808.50	167.	-11.	194.	-0.	15390	398
	920207	072826.65	166.	-9.	194.	-0.	15390	398
	920207	072845.71	165.	-8.	194.	0.	15390	398
	920207	072904.82	166.	-6.	194.	0.	15390	398

S/	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH		
	DATE	TIME	ALT	ΔU	ΔV	ΔW	TAG	SENSOR
	920207	072924.02	167.	-4.	195.	0.	15390	398
	920207	072943.26	169.	-2.	194.	-1.	15390	398
	920207	120331.15	840.	53.	178.	-1.	15390	398
	920207	120527.37	1016.	58.	171.	0.	15390	398
	920207	120727.41	1207.	61.	164.	0.	15390	398
	920207	120932.79	1412.	63.	158.	-1.	15390	398
	920207	121128.11	1608.	65.	151.	-1.	15390	398
	920207	121329.30	1813.	65.	147.	-2.	15390	398
	920208	050436.75	632.	-72.	222.	0.	15390	398
	920208	050528.32	567.	-69.	226.	-0.	15390	398
	920208	050624.96	500.	-65.	230.	-0.	15390	398
	920208	050722.33	437.	-61.	234.	-0.	15390	398
	920208	050819.64	380.	-57.	237.	-0.	15390	398
	920208	050917.26	328.	-52.	241.	-0.	15390	398
	920208	094258.60	326.	31.	260.	-1.	15390	398
	920208	094403.72	384.	38.	257.	-1.	15390	398
	920208	094512.84	455.	45.	252.	0.	15390	398
	920208	094622.12	533.	51.	248.	-1.	15390	398
	920208	094731.68	619.	57.	243.	-1.	15390	398
	920208	094840.97	710.	62.	238.	-1.	15390	398
	920208	215222.16	4229.	-84.	146.	4.	15390	398
	920208	215414.76	4069.	-86.	151.	5.	15390	398
	920208	215615.65	3890.	-90.	153.	0.	15390	398
	920208	215817.34	3708.	-93.	157.	0.	15390	398
	920208	220048.70	3475.	-96.	162.	-1.	15390	398
	920208	220252.49	3276.	-103.	170.	-7.	15390	398
	920209	023657.23	1795.	-113.	221.	-0.	15390	398
	920209	024051.34	1601.	-113.	229.	1.	15390	398
	920209	024252.58	1396.	-112.	238.	1.	15390	398
	920209	024451.13	1201.	-110.	248.	0.	15390	398
	920209	024650.96	1012.	-106.	258.	1.	15390	398
	920209	024851.13	830.	-102.	269.	-0.	15390	398
	920209	072238.54	166.	-29.	339.	-0.	15390	398
	920209	072252.99	167.	-27.	339.	-0.	15390	398
	920209	072312.52	166.	-24.	340.	-0.	15390	398
	920209	072332.67	166.	-21.	340.	-0.	15390	398
	920209	072351.04	166.	-18.	340.	-1.	15390	398
	920209	072410.52	168.	-15.	340.	-1.	15390	398
	920209	115754.19	817.	86.	311.	-1.	15390	398
	920209	115924.96	952.	93.	302.	-1.	15390	398
	920209	120059.77	1099.	96.	292.	-2.	15390	398
	920209	120234.81	1252.	103.	284.	-1.	15390	398
	920209	120409.88	1410.	107.	274.	-0.	15390	398
	920209	120544.80	1568.	109.	267.	-1.	15390	398
	920210	045915.51	622.	-129.	371.	0.	15390	398
	920210	093716.01	316.	37.	438.	-3.	15390	398
	920210	093807.19	360.	47.	434.	-1.	15390	398
	920210	093902.39	414.	57.	429.	-0.	15390	398
	920210	093957.67	472.	67.	424.	-1.	15390	398
	920210	094052.78	535.	75.	418.	-0.	15390	398
	920210	094148.35	603.	84.	411.	-1.	15390	398
15392	21.50	115.76	-.0001	84 315 8	83.95	920211		
	920211	113658.87	1017.	-241.	2077.	10.	90447	385
15529	90.29	111.30	-.0002	65 027 S	103.62	920211		
	920211	035934.63	707.	-98.	902.	16.	19185	396
	920211	035944.50	706.	-98.	902.	16.	19185	396
	920211	035954.40	706.	-98.	902.	16.	19185	396
15530	90.29	111.36	-.0002	65 027 T	102.94	920211		
	920211	035934.63	707.	-46.	-648.	-13.	19185	396
	920211	035944.50	706.	-46.	-548.	-13.	19185	396

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG AU	R.A. AV	EPOCH AW	TAG	SENSOR
	920211	035954.40	706.	-45.	-648.	-13.	19185	396
15555	65.00	115.64	-.0004	76 126 BT	133.22	920211		
	920211	191315.07	780.	113.	1520.	20.	95222	393
15562	7.18	583.60	-.0254	85 015 C	308.54	920210		
	920129	235638.11	622.	-878.	2280.	-29.	88788	398
	920129	235722.03	751.	-865.	2258.	-6.	88788	398
	920129	235803.60	683.	-863.	2246.	11.	88788	398
15596	108.06	100.33	-.0002	85 021 B	42.97	920212		
	920211	043719.26	444.	10.	-197.	-14.	86777	329
15679	7.17	485.15	-.0565	65 035 C	3.25	920208		
	920211	175001.63	13042.	-428.	4501.	-49.	89416	242
	920211	175040.09	13031.	-426.	4491.	-45.	89416	242
	920211	175147.94	12958.	-423.	4472.	-33.	89416	242
	920211	175257.00	12903.	-420.	4452.	-31.	89416	242
	920211	175401.07	12851.	-417.	4433.	-24.	89416	242
	920211	175544.14	12766.	-412.	4401.	-14.	89416	242
	920211	175630.24	12744.	-410.	4392.	-11.	89416	242
	920211	17564'.24	12718.	-409.	4382.	-8.	89416	242
	920211	175709.66	12694.	-407.	4373.	-5.	89416	242
	920211	175728.50	12679.	-402.	4355.	-20.	90004	241
	920211	175758.10	12654.	-401.	4347.	-38.	90004	241
	920211	175828.40	12628.	-400.	4338.	-14.	900[illegible]	241
	920211	175847.64	12611.	-402.	4340.	4.	894[illegible]	242
	920211	175859.75	12603.	-398.	4329.	-12.	90004	241
	920211	175917.69	12585.	-400.	4329.	7.	89416	242
	920211	175951.58	12555.	-398.	4317.	10.	89416	242
	920211	180017.19	12533.	-397.	4308.	13.	89416	242
15680	6.69	304.49	.0006	85 035 D	21.62	920208		
	920210	224108.97	3971.	-395.	5397.	23.	89412	242
	920210	224146.21	3851.	-302.	5201.	8.	89412	242
	920210	224225.01	3725.	-209.	4995.	-8.	89412	242
	920210	224301.19	3607.	-128.	4800.	-23.	89412	242
	920210	224446.40	3251.	123.	4163.	-37.	89413	242
	920210	230946.67	3028.	300.	-4867.	-28.	89413	242
	920210	231016.88	3150.	186.	-5107.	-11.	89413	242
	920210	231048.99	3280.	53.	-5360.	7.	89413	242
15741	64.05	732.26	-.0018	85 040 0	20.62	920211		
	920211	090946.74	1204.	-1365.	-2172.	31.	90438	385
15758	62.28	101.03	-.0018	68 091 CZ	201.07	920130		
	920211	104746.33	568.	-124.	1056.	1.	15758	396
	920211	104756.20	569.	-124.	1056.	0.	15758	396
	920211	104806.07	570.	-124.	1055.	0.	15758	396
15764	90.48	105.84	-.0001	73 081 C	56.78	920212		
	920211	111706.68	648.	-12.	1141.	15.	94717	399
15767	82.93	103.70	-.0020	81 053 KF	131.47	920211		
	920211	061147.69	490.	-41.	-541.	-15.	93915	396
	920211	061157.56	490.	-41.	-541.	-14.	93915	396
	920211	061207.43	489.	-41.	-541.	-14.	93915	396
	920211	061217.30	489.	-41.	-541.	-13.	93915	396
15783	67.05	101.04	-.0013	61 OMI 271	121.36	920211		
	920211	100130.79	493.	-126.	1261.	-6.	93938	396
15789	103.17	121.03	-.0002	73 066 GS	207.85	920211		

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	920211	203800.34	1154.	-380.	2519.	13.	7015	399
15826	.02	1436.13	0.0000	65 048 D	219.714	920211		
	920211	085933.98	19327.	2.	-20.	-2.	90000	951
	920211	085949.03	19327.	2.	-20.	-2.	90000	951
	920211	090003.68	19327.	2.	-20.	-2.	90000	951
	920211	090018.48	19327.	2.	-20.	-2.	90000	951
15832	25.32	626.25	-.0062	85 048 F	101.77	920211		
	920211	044219.88	840.	259.	240.	3.	94695	399
15836	26.82	619.19	-.0066	85 048 G	94.01	920211		
	920210	200459.89	1287.	-1100.	-2044.	13.	82080	222
	920210	200554.17	1392.	-1235.	-2304.	-29.	82080	222
	920211	055820.39	125.	-1189.	2345.	25.	94700	399
	920211	055826.67	125.	-1160.	2321.	-1.	94700	399
15916	64.47	737.91	-.0008	65 061 0	299.47	920211		
	920211	173725.84	11565.	-1054.	7671.	-33.	90003	241
	920211	173743.47	11534.	-1043.	7639.	-16.	89417	242
	920211	173801.52	11502.	-1032.	7606.	2.	90003	241
	920211	173812.63	11482.	-1026.	7585.	13.	89417	242
	920211	173841.65	11430.	-1006.	7531.	41.	89417	242
15935	89.91	107.92	-.0001	85 066 A	34.38	920212		
	920210	094148.35	603.	-152.	797.	6.	15390	398
	920211	064807.63	583.	-32.	512.	-8.	90000	329
	920211	083930.42	609.	-19.	537.	-12.	90000	329
	920211	193756.79	638.	-33.	522.	6.	90000	329
	920211	212117.31	627.	-27.	525.	8.	90000	329
	920211	212219.81	626.	-31.	522.	-12.	90024	329
	920211	212322.30	623.	-40.	530.	1.	90000	329
15938	89.91	107.94	-.0000	85 006 C	34.01	920211		
	920208	094731.68	619.	-232.	-1162.	-11.	15390	398
15986	64.68	103.89	-.0000	85 075 A	191.27	920211		
	920211	220345.70	494.	-352.	-1642.	2.	95283	393
15994	.01	1436.12	0.0000	85 076 C	153.12	920210		
	920211	085933.98	19233.	-123.	1158.	-5.	90000	951
	920211	085949.03	19233.	-123.	1158.	-5.	90060	951
	920211	090003.68	19233.	-123.	1157.	-5.	90000	951
	920211	090018.48	19233.	-123.	1157.	-5.	90000	951
16106	66.84	703.63	-.0002	85 088 0	356.94	920211		
	920211	201133.77	11571.	-159.	-9969.	39.	83410	369
	920211	201229.93	11494.	-368.	-9989.	-11.	83410	369
16137	63.72	366.24	-.0006	85 093 B	108.12	920211		
	920211	091108.41	1062.	-280.	-1894.	-40.	93931	396
	920211	091118.27	1062.	-274.	-1905.	-30.	93931	396
	920211	091121.25	1062.	-273.	-3909.	-27.	93931	396
16209	65.84	104.52	-.0001	62 055 L	46.85	920212		
	920211	052102.97	508.	-20.	29.	-10.	89324	232
	920211	052128.54	552.	23.	-29.	6.	89324	232
16214	4.28	1431.15	0.0000	85 102 D	67.85	920210		
	920211	120229.50	19311.	1.	-14.	8.	83999	222
	920211	120320.58	19331.	2.	-17.	9.	83999	222
	920211	120406.11	19311.	2.	-15.	9.	83999	222
	920211	120503.94	19311.	2.	-14.	9.	83999	222

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
	920211	120805.44	19311.	2.	-15.	9.	83999	222
	920211	120844.16	19311.	2.	-18.	10.	83999	222
	920211	121000.75	19310.	2.	-16.	10.	83999	222
	920211	121038.61	19310.	2.	-16.	10.	83999	222
	920211	121159.66	19310.	2.	-16.	9.	83999	222
	920211	144012.71	19281.	3.	-17.	20.	83999	221
	920211	144034.02	19281.	3.	-17.	20.	83999	221
	920211	144053.94	19281.	3.	-17.	20.	83999	221
	920211	144114.03	19281.	3.	-17.	20.	83999	221
16229	26.95	275.80	-.0077	85 028 E	83.92	920206		
	920211	110625.25	345.	-573.	2147.	18.	94716	399
16262	82.50	97.07	-.0005	85 108 A	115.75	920211		
	920211	091752.36	322.	-9.	-42.	0.	89832	232
	920211	091818.53	324.	-9.	-148.	-5.	89832	232
	920211	091839.88	338.	0.	-239.	1.	89832	232
16268	82.72	114.98	-.0001	85 094 M	27.05	920212		
	920210	195250.54	747.	-11.	166.	-16.	89207	221
	920210	195337.45	753.	-0.	-14.	-7.	89207	221
16375	65.84	104.44	-.0000	82 055 P	24.23	920212		
	920211	061147.69	490.	-100.	-678.	-0.	93915	396
16390	70.98	105.11	-.0001	85 097 D	11.92	920213		
	920211	061217.30	489.	36.	78.	-9.	93915	396
	920211	080708.77	490.	-94.	929.	-15.	94707	399
16391	71.01	104.78	-.0002	85 097 E	347.49	920212		
	920211	205728.86	456.	-217.	-1294.	13.	94000	396
16396	66.10	675.73	.0006	85 118 A	18.93	920210		
	920210	223052.30	10287.	-211.	-2162.	-48.	89405	242
	920210	223123.74	10286.	-221.	-2214.	-20.	89405	242
	920210	223157.03	10285.	-231.	-2268.	10.	89405	242
	920210	223225.69	10284.	-240.	-2315.	35.	89405	242
	920210	225805.88	10355.	-1169.	-5623.	-32.	89415	242
16497	4.36	1457.33	0.0000	86 007 A	69.51	920211		
	920211	120229.50	19686.	-35.	535.	-16.	83999	222
	920211	120320.58	19686.	-35.	535.	-16.	83999	222
	920211	120406.11	19686.	-35.	538.	-15.	83999	222
	920211	120503.94	19686.	-35.	543.	-15.	83999	222
	920211	120805.44	19685.	-36.	550.	-16.	83999	222
	920211	120844.16	19685.	-36.	550.	-16.	83999	222
	920211	121000.75	19685.	-36.	555.	-16.	83999	222
	920211	121038.63	19685.	-37.	556.	-16.	83999	222
	920211	121159.66	19684.	-37.	560.	-17.	83999	222
	920211	144012.71	19621.	-79.	993.	-39.	83999	221
	920211	144034.02	19621.	-79.	994.	-39.	83999	221
	920211	144053.94	19621.	-79.	995.	-39.	83999	221
	920211	144114.03	19621.	-79.	996.	-39.	83999	221
16527	63.88	717.48	-.0053	86 011 A	84.37	920211		
	920211	051456.85	2181.	-344.	2724.	-44.	89810	232
	920211	051518.85	2164.	-329.	538.	-33.	89810	232
	920211	051620.84	2120.	-288.	2378.	-3.	89810	232
	920211	051646.07	2106.	-274.	2274.	7.	89810	232
	920211	051741.41	2033.	-247.	2053.	23.	89810	232
	920211	051804.41	2076.	-238.	1963.	28.	89810	232
	920211	051823.71	2072.	-231.	1888.	31.	89810	232
	920211	051847.93	2069.	-223.	1798.	33.	89810	232

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH		
	DATE	TIME	ALT	ΔU	ΔV	ΔW	TAG	SENSOR
16533	63.97	705.74	0.0000	86 011 F	83.02	920210		
	920211	091049.88	9225.	101.	-482.	-48.	89376	232
	920211	091113.51	9262.	103.	-497.	-41.	89376	232
	920211	091134.08	9295.	104.	-511.	-35.	89376	232
	920211	091202.36	9339.	105.	-530.	-27.	89376	232
16615	98.52	100.42	-.0017	86 019 C	111.90	920211		
	920211	083306.92	398.	-204.	1141.	-2.	89336	232
16719	82.55	97.05	-.0006	86 034 A	189.97	920211		
	920210	205626.24	315.	-356.	1551.	3.	19994	399
16720	82.56	97.46	-.0002	86 034 B	195.03	920211		
	920210	093807.19	360.	-41.	-647.	3.	15390	398
16939	64.78	731.31	.0041	86 068 C	133.91	920209		
	920211	125157.84	3761.	-1362.	6171.	42.	88769	334
16953	74.01	100.45	-.0002	86 070 B	4.31	920211		
	920211	080552.99	397.	-127.	880.	-17.	94707	399
16963	64.64	675.74	.0003	86 071 C	139.35	920210		
	920211	050100.73	10324.	-20.	620.	-40.	21854	369
	920211	050142.24	10324.	-21.	620.	-43.	21854	369
	920211	050213.09	10324.	-20.	620.	-45.	21854	369
	920211	050242.85	10324.	-20.	620.	-47.	21854	369
	920211	050313.59	10324.	-20.	620.	-48.	21854	369
	920211	050350.93	10325.	-20.	620.	-49.	21854	369
16968	64.85	675.21	-.0004	86 071 F	139.25	920211		
	920211	050100.73	10324.	-117.	1710.	-41.	21854	369
	920211	050142.24	10324.	-118.	1711.	-44.	21854	369
	920211	050213.09	10324.	-118.	1713.	-46.	21854	369
	920211	050242.85	10324.	-118.	1711.	-47.	21854	369
	920211	050313.59	10324.	-117.	1711.	-49	21854	369
	920211	050350.93	10325.	-117.	1711.	-50.	21854	369
16987	82.52	67.49	-.0001	86 074 B	202.65	920211		
	920211	175917.69	346.	-8.	-34.	-16.	89416	242
	920211	175951.58	345.	-13.	-170.	-7.	89416	242
17000	102.49	128.41	-.0013	76 077 EX	296.24	920211		
	920211	172952.42	3450.	189.	636.	2.	90000	241
	920211	173019.24	1409.	155.	536.	13.	90000	241
17116	99.12	100.44	-.0038	86 019 L	184.21	920211		
	920211	080611.17	418.	15.	68.	-5.	94707	399
17123	98.34	100.07	-.0035	86 019 T	68.53	920211		
	920115	235247.13	422.	-70.	-758.	9.	88904	398
17128	98.86	102.40	-.0025	86 019 X	90.94	920211		
	920211	064928.93	490.	-7.	-98.	-9.	89871	231
	920211	064956.54	503.	3.	-213.	-17.	89871	231
17130	98.55	100.50	-.0024	86 019 Z	106.66	920211		
	920211	003102.63	453.	11.	-367.	8.	90000	329
	920211	031640.59	448.	-308.	1551.	16.	94687	399
17141	74.01	115.07	-.0000	86 092 D	72.07	920212		
	920211	191017.87	788.	-232.	-1414.	9.	95222	393
17164	89.34	108.23	-.0001	85 066 G	276.67	920211		

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH		
	DATE	TIME	ALT	ΔU	ΔV	ΔW	TAG	SENSOR
	920123	042305.72	552.	-98.	755.	-2.	88893	398
17181	.58	1436.41	0.0000	86 096 A	303.15	920231		
	920211	090453.32	19327.	-1031.	-9925.	12.	20946	334
17189	98.03	99.97	-.0203	86 019 AT	271.24	920211		
	920211	194610.19	423.	5.	-125.	-18.	86622	329
17216	64.06	705.83	-.0006	86 098 D	79.51	920211		
	920211	123304.12	7057.	-119.	-970.	30.	93970	399
17239	82.93	105.02	-.0000	86 100 A	63.43	920212		
	920211	052307.17	526.	-6.	4.	-16.	89812	232
17253	8.23	540.80	-.0411	86 026 E	121.31	920124		
	920114	103256.76	5280.	135.	139.	-3.	17253	334
	920114	103453.90	5510.	132.	141.	-10.	17253	334
	920114	103504.50	5531.	133.	144.	-9.	17253	334
	920114	103515.14	5553.	134.	142.	-2.	17253	334
	920114	103536.53	5595.	133.	145.	-3.	17253	334
	920114	105051.82	7276.	117.	120.	-6.	17253	334
	920114	105316.72	7526.	116.	125.	6.	17253	334
	920114	105529.58	7752.	117.	108.	26.	17253	334
	920114	105619.19	7835.	116.	111.	32.	17253	334
17307	97.76	95.89	-.1105	86 019 CP	221.22	920211		
	920211	081411.31	314.	2.	1.	2.	90000	329
17333	63.32	730.79	.0010	87 008 D	93.28	920210		
	920211	093927.84	5700.	-534.	-2024.	44.	89832	232
	920211	093948.48	5736.	-548.	-2079.	36.	89832	232
	920211	094011.52	5776.	-565.	-2140.	28.	89832	232
	920211	094223.80	6011.	-662.	-2487.	-26.	89832	233
	920211	094258.77	6073.	-688.	-2578.	-41.	89832	233
17359	82.93	104.63	-.0001	87 009 A	327.55	920211		
	920211	194036.11	547.	-125.	1004.	-10.	87272	396
17481	31.08	94.62	-.0058	87 012 B	216.58	920211		
	920204	215632.71	299.	-6.	-472.	-10.	19994	399
17628	82.76	100.57	-.0048	81 053 LA	287.88	920211		
	920211	003102.63	453.	-131.	1109.	-12.	90000	329
17665	78.67	110.95	-.0042	63 053 K	301.54	920211		
	920211	041232.53	695.	-112.	1061.	-16.	93903	396
	920211	041242.40	695.	-97.	989.	-2.	93903	396
	920211	041252.25	694.	-83.	916.	11.	93903	396
17670	65.74	105.09	-.0113	76 126 BV	199.83	920211		
	920210	205651.27	306.	-274.	1260.	-14.	19994	399
	920210	205741.45	288.	-284.	1266.	8.	19994	399
17698	98.53	91.57	-.3479	86 019 LW	164.03	920207		
	920207	072820.65	166.	-276.	1335.	-11.	15390	398
17719	99.42	104.96	-.0021	70 025 PH	78.68	920231		
	920211	051401.39	537.	8.	-669.	-6.	89810	232
17754	74.04	100.76	-.0009	85 079 C	190.28	920211		
	920211	182853.30	406.	-70.	-661.	-15.	95201	393
17872	11.80	1436.78	0.0000	75 092 F	44.00	920208		

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
	920210	224446.40	19409.	-340.	4480.	-12.	89413	242
	920210	224519.31	19409.	-340.	4479.	-8.	89413	242
	920210	224554.37	19409.	-340.	4479.	-4.	89413	242
	920210	224624.95	19409.	-340.	4478.	-0.	89413	242
18241	65.01	103.69	.0000	87 052 D	110.31	920211		
	920211	065558.62	523.	-106.	1028.	-17.	13464	396
	920211	065608.49	523.	-103.	1018.	9.	13464	396
18257	74.05	100.24	-.0014	87 006 C	147.31	920211		
	920211	175645.72	404.	-43.	-521.	17.	93974	396
18270	90.28	111.38	-.0006	65 027 Z	102.70	920211		
	920211	040952.82	705.	-1.	-103.	7.	93902	396
	920211	041002.69	705.	-1.	-103.	7.	93902	396
	920211	041012.56	705.	-2.	-102.	7.	93902	396
	920211	041032.30	704.	-2.	-102.	7.	93902	396
18272	64.01	114.82	-.0005	76 067 BL	289.34	920211		
	920211	184303.83	561.	-299.	1757.	-4.	93983	396
18277	81.19	94.44	-.0061	71 003 C	115.58	920211		
	920211	125447.90	237.	-366.	1568.	-13.	94139	393
	920211	125625.30	238.	-103.	810.	-18.	94139	393
18279	65.83	105.34	-.0014	82 055 8B	102.75	920211		
	920210	211939.45	535.	-342.	-1652.	-17.	89298	221
18415	65.83	105.78	.0001	82 055 8E	213.57	920211		
	920211	122444.75	600.	72.	-143.	10.	93957	396
	920211	122454.62	606.	72.	-139.	-16.	93957	396
18418	100.13	106.17	-.0014	70 025 PL	120.20	920211		
	920208	050528.32	567.	-21.	392.	-3.	15390	398
18467	98.71	101.71	-.0003	78 026 HE	26.66	920210		
	920211	191058.55	482.	40.	-158.	-18.	95223	393
18471	65.77	118.66	-.0007	76 067 BN	161.12	920211		
	920211	000514.37	624.	-359.	-1865.	3.	86734	329
18511	302.64	112.32	-.0106	73 086 GV	354.13	920211		
	920211	190907.62	871.	328.	-671.	-18.	95219	393
18512	74.04	99.81	-.0014	77 119 E	115.51	920211		
	920211	154408.01	418.	-151.	1104.	19.	19261	399
18518	65.77	113.41	-.0001	76 126 BW	210.84	920211		
	920211	040254.32	679.	-185.	1841.	-13.	86778	329
18527	70.99	104.89	-.0001	87 027 E	84.44	920211		
	920211	011415.85	464.	-348.	1435.	-3.	94679	399
18538	90.30	111.35	-.0001	65 027 AF	102.63	920205		
	920211	035934.63	707.	-206.	1289.	-20.	19185	396
	920211	035944.50	706.	-206.	1289.	-20.	19185	396
	920211	035954.40	706.	-206.	1289.	-20.	19185	396
	920211	040952.82	705.	-124.	-1009.	10.	93902	396
	920211	041002.69	705.	-124.	-1009.	9.	93902	396
	920211	041012.56	705.	-124.	-1008.	9.	93902	396
	920211	041032.30	704.	-124.	-1008.	9.	93902	396
18549	62.22	113.36	-.0020	68 091 OE	38.36	920211		

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
	920210	211939.45	913.	-19.	-7.	-17.	89298	221
18565	82.39	111.58	-.0014	81 053 LY	237.00	920211		
	920211	113026.17	720.	79.	-233.	11.	90223	382
18571	7.05	546.33	-.0989	87 078 L	176.95	920211		
	920210	232056.94	10517.	-223.	2852.	6.	89413	242
	920210	232721.32	10484.	-220.	2835.	-2.	89413	242
	920210	232742.25	10456.	-218.	2820.	-8.	89413	242
	920210	232803.48	10427.	-215.	2805.	-14.	89413	242
18589	58.46	149.73	.0028	64 006 N	308.52	920211		
	920211	073121.06	1997.	31.	1210.	25.	89810	232
	920211	073142.81	1969.	30.	1131.	19.	89610	232
	920211	073221.36	1921.	27.	994.	8.	89810	232
18591	101.58	136.75	-.0006	76 077 FD	223.69	920211		
	920211	100951.00	685.	-386.	455.	-7.	94714	399
	920211	223833.29	1778.	-101.	2762.	-0.	94749	399
18601	82.83	104.55	-.0006	81 053 MB	130.39	920206		
	920211	051519.34	516.	45.	133.	3.	18601	399
	920211	051523.71	516.	45.	132.	3.	18601	399
	920211	051538.43	537.	45.	131.	3.	18601	399
	920211	051554.33	517.	44.	129.	3.	18601	399
	920211	051609.32	517.	44.	128.	3.	18601	399
18606	65.85	116.27	-.0003	76 067 BP	353.40	920211		
	920128	233002.62	808.	-293.	-1698.	4.	88892	398
18644	66.98	101.75	-.0035	80 030 AY	104.51	920211		
	920211	191058.55	482.	-253.	1495.	-3.	95223	393
18645	102.14	116.64	-.0000	73 086 GW	330.14	920203		
	920211	074226.79	887.	23.	-147.	5.	93925	396
18689	65.84	124.69	-.0000	76 067 3R	79.57	920201		
	920210	223458.82	908.	-124.	795.	-1.	90220	395
18693	101.63	116.53	-.0011	74 089 FA	120.99	920211		
	920211	171026.39	874.	147.	55.	12.	94742	399
18779	98.96	103.76	-.0017	78 026 HJ	282.01	920211		
	920211	083330.45	446.	-206.	-889.	-12.	89338	232
18864	29.04	104.56	-.0041	77 065 FV	298.99	920211		
	920211	031423.87	794.	144.	-1023.	-13.	94567	399
18946	83.28	717.88	.0015	88 017 A	121.58	920211		
	920211	180017.19	3841.	-1428.	6593.	-41.	89416	242
18955	98.50	98.12	-.0115	88 006 D	319.01	920211		
	920211	053140.08	362.	1.	9.	10.	18955	399
	920211	065624.74	357.	-2.	7.	14.	18955	396
	920211	065634.61	357.	-2.	7.	14.	18955	396
	920211	065644.48	357.	-2.	8.	14.	18955	396
18965	90.30	111.41	-.0002	65 027 AN	103.38	920211		
	920211	035934.63	707.	-96.	886.	6.	19185	396
	920211	035944.50	706.	-96.	879.	6.	19185	396
	920211	035954.40	706.	-96.	879.	5.	19185	396
	920211	073327.14	682.	-222.	1258.	7.	89376	232

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
18985	82.95	104.67	-.0000	88 023 A	88.37	920212		
	920124	052920.50	515.	-2.	-106.	-6.	12102	385
18997	65.73	105.91	-.0042	77 121 BR	301.69	920211		
	920211	175641.24	446.	48.	-417.	-8.	89416	242
	920211	175709.66	509.	100.	-557.	5.	89416	242
	920211	175726.50	559.	138.	-655.	14.	90004	241
19006	73.50	113.80	-.0022	87 020 BB	245.70	920212		
	920211	142551.88	728.	-65.	-497.	18.	94720	399
19051	87.23	166.17	0.0000	63 014 EA	289.07	920210		
	920211	091904.06	1489.	-20.	73.	-22.	89832	232
19105	98.75	99.62	-.0006	75 004 HN	300.12	920211		
	920211	174459.73	449.	30.	87.	4.	89417	242
	920211	174508.59	435.	17.	53.	14.	89415	241
	920211	174525.20	416.	-1.	-9.	13.	89417	242
19106	30.46	104.34	-.0019	63 047 T	163.86	920211		
	920205	130741.94	649.	-267.	-1587.	-16.	88079	398
19111	82.01	113.85	-.0002	85 094 V	340.24	920205		
	920211	195216.51	756.	-1.	16.	-0.	19111	396
	920211	195226.35	756.	-1.	16.	-0.	19111	396
	920211	195236.22	756.	-1.	16.	0.	19111	396
19113	90.30	111.05	-.0000	65 027 AQ	103.77	920211		
	920211	041222.66	695.	-63.	-723.	-4.	93903	396
	920211	041232.53	695.	-63.	-724.	-4.	93903	396
	920211	041242.40	695.	-63.	-724.	-4.	93903	396
	920211	041252.25	694.	-63.	-723.	-4.	93903	396
	920211	041302.14	694.	-63.	-723.	-3.	93903	396
19136	82.42	112.20	-.0005	78 100 J	143.45	920231		
	920211	101116.87	671.	111.	-260.	18.	89813	232
19150	100.36	107.05	-.0018	70 025 PS	211.81	920211		
	920126	083727.69	630.	16.	-198.	11.	3899	745
19163	64.95	675.73	-.0003	86 043 A	139.05	920211		
	920211	041454.07	10317.	-13.	-75.	39.	21854	404
	920211	041535.20	10316.	-15.	-79.	44.	21854	404
	920211	041616.34	10315.	-15.	-96.	27.	21854	404
	920211	041657.47	10316.	-15.	-86.	35.	21854	404
	920211	041738.61	10315.	-15.	-83.	39.	21854	404
	920211	041819.74	10315.	-15.	-88.	37.	21854	404
	920211	041900.87	10315.	-15.	-92.	29.	21854	404
	920211	041942.01	10317.	-13.	-80.	25.	21854	404
	920211	042023.14	10315.	-15.	-85.	38.	21854	404
	920211	042104.28	10313.	-17.	-97.	34.	21854	404
	920211	042145.41	10315.	-15.	-93.	24.	21854	404
	920211	042226.55	10318.	-12.	-66.	32.	21854	404
	920211	042307.68	10315.	-15.	-86.	32.	21854	404
	920211	042348.81	10316.	-14.	-91.	20.	21854	404
	920211	042429.95	10315.	-14.	-87.	27.	21854	404
	920211	042511.08	10314.	-15.	-90.	30.	21854	404
	920211	042552.22	10315.	-14.	-94.	18.	21854	404
	920211	042633.35	10312.	-18.	-108.	28.	21854	404
19169	65.41	339.87	-.0001	88 043 G	64.70	920210		
	920211	041616.34	10315.	-580.	5702.	-7.	21854	404

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH		
	DATE	TIME	ALT	ΔU	ΔV	ΔW	TAG	SENSOR
19170	65.34	339.93	-.0000	88 043 H	64.86	920209		
	920211	041535.20	10316.	-235.	5976.	-30.	21854	404
	920211	041616.34	10315.	-249.	5952.	28.	21854	404
19185	90.29	111.36	-.0000	65 027 AR	102.75	920211		
	920211	073057.02	699.	-40.	508.	-15.	89810	232
	920211	073121.06	680.	-49.	408.	-12.	89810	232
	920211	073142.81	669.	-52.	321.	-12.	89810	232
	920211	073221.36	666.	-46.	173.	-20.	89810	232
19235	74.02	104.01	-.0001	86 030 H	121.13	920231		
	920211	174633.88	495.	-20.	151.	-9.	89415	241
	920211	174634.25	495.	-20.	147.	-2.	89417	242
	920211	174701.55	503.	-8.	46.	-16.	89415	241
	920211	174711.38	511.	-1.	7.	-11.	89417	242
19293	66.98	110.10	-.0003	61 OMI 239	130.90	920210		
	920211	044449.29	802.	97.	-638.	-15.	94695	399
19318	65.81	103.91	-.0062	71 015 DR	325.10	920209		
	920211	033025.09	712.	374.	-539.	12.	93901	396
19352	81.99	106.55	-.0984	78 100 AF	167.45	920210		
	920211	023952.93	673.	20.	35.	11.	86712	329
19362	62.81	108.08	-.0029	68 091 OJ	276.95	920212		
	920211	035847.67	726.	64.	1719.	-5.	90201	382
19380	65.01	730.82	-.0088	88 069 0	272.16	920211		
	920211	083818.91	4110.	-355.	-2691.	-14.	89832	232
	920211	083843.59	4077.	-354.	-2735.	12.	89832	232
	920211	083904.72	4049.	-352.	-2774.	33.	89832	232
19396	58.49	98.17	-.0001	63 054 E	29.56	920211		
	920210	093807.19	360.	-25.	-369.	-13.	15390	398
19437	72.58	105.93	-.0642	87 020 BZ	129.97	920209		
	920211	225736.68	637.	-16.	349.	8.	90000	329
	920211	064921.49	626.	-1.	285.	0.	93919	396
	920211	064931.36	627.	-1.	284.	0.	93919	396
	920211	064955.04	628.	-1.	284.	-0.	93919	396
	920211	065004.91	628.	-1.	284.	0.	93919	396
19473	65.83	104.74	-.0006	82 055 BL	99.50	920211		
	920208	050624.96	500.	-142.	-974.	-5.	15390	398
19479	62.82	107.18	-.0015	68 097 ET	308.08	911101		
	920206	120547.77	544.	-48.	768.	1.	21538	398
	920211	131850.04	809.	222.	-1091.	-16.	90233	383
	920211	131900.09	827.	239.	-1108.	18.	90233	383
19482	66.35	99.52	-.0034	61 OMI 295	317.24	920211		
	920211	185858.68	458.	18.	58.	-2.	89298	243
	920211	185926.40	431.	-9.	-43.	2.	89298	243
	920211	185956.86	426.	-17.	-160.	10.	89298	243
19484	.02	1436.12	0.0000	88 081 B	337.73	920203		
	920211	085933.98	19413.	63.	-1008.	-17.	90000	951
	920211	085949.03	19413.	63.	-1008.	-17.	90000	951
	920211	090003.68	19413.	63.	-1008.	-17.	90000	951
	920211	090018.48	19413.	63.	-1008.	-17.	90000	951
19502	65.55	675.73	.0001	86 085 B	18.18	920210		

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH		
	DATE	TIME	ALT	ΔU	ΔV	ΔW	TAG	SENSOR
	920211	093241.74	10318.	-5.	-46.	1.	89336	232
19541	64.79	717.53	-.0001	88 090 A	273.61	920211		
	920211	084751.73	5496.	-169.	-1615.	-39.	89832	232
	920211	084813.75	5461.	-166.	-1649.	-13.	89832	232
	920211	084836.37	5424.	-164.	-1684.	12.	89832	232
	920211	084857.67	5389.	-161.	-1716.	36.	89832	232
19560	62.33	116.62	-.0002	68 091 DL	108.82	920210		
	920209	151846.06	1040.	-210.	2067.	-7.	88079	398
19574	82.53	97.47	-.0002	88 093 B	122.23	920211		
	920211	094223.80	337.	-37.	-235.	18.	89832	233
19576	90.29	111.14	-.0002	65 027 AV	104.40	920209		
	920113	055312.35	705.	-380.	-3748.	11.	12102	399
	920113	055336.03	705.	-361.	-1748.	12.	12102	399
	920113	055423.11	706.	-380.	-1749.	11.	12102	399
	920113	055509.31	706.	-380.	-1749.	11.	12102	399
	920113	055555.20	706.	-380.	-1750.	11.	12102	399
19590	102.38	116.61	-.0000	73 086 HF	22.98	920211		
	920211	131850.04	809.	-129.	-959.	0.	90233	383
19608	63.26	717.07	.0057	88 096 A	107.09	920211		
	920211	031726.20	1128.	-1114.	-514.	15.	94567	399
19611	63.53	704.92	.0004	88 096 D	104.35	920211		
	920211	125727.81	10302.	629.	1051.	-1.	83410	369
	920211	125727.81	10302.	629.	1051.	-1.	83421	369
19656	70.99	105.18	-.0002	88 102 C	205.03	920211		
	920211	101933.53	631.	-35.	821.	5.	94491	399
19659	71.04	104.76	-.0003	88 102 F	190.15	920211		
	920206	095138.79	540.	-170.	-905.	-13.	15390	398
19690	7.02	392.71	-.1236	88 109 D	288.33	920211		
	920114	201939.79	1000.	194.	946.	19.	21692	398
	920114	202005.10	957.	198.	906.	-43.	21692	398
19771	46.64	331.47	-.1791	89 004 E	117.84	920211		
	920206	150119.14	1055.	-752.	-3115.	43.	88079	398
19822	75.09	193.00	-.0197	89 016 A	292.55	920211		
	920211	074001.84	497.	154.	169.	-3.	89324	232
19853	82.97	106.41	-.0004	81 053 MN	285.02	920210		
	920211	073534.40	506.	-60.	-77.	6.	89812	232
19877	6.63	212.78	-1.3103	89 020 C	259.61	920211		
	920206	143035.10	2210.	426.	-1926.	31.	15390	398
	920210	230244.97	384.	276.	422.	6.	89413	242
	920210	230314.40	257.	168.	257.	-25.	89413	242
19948	99.56	113.31	-.0001	70 025 QD	234.84	920211		
	920211	223435.15	788.	-238.	-947.	-10.	94750	399
19950	90.31	111.43	.0000	65 027 AY	103.04	920204		
	920213	152431.18	699.	-240.	1390.	1.	81560	399
	920211	152506.47	699.	-240.	1390.	2.	81580	399
19952	75.61	155.90	-.0881	89 016 K	236.61	920210		

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
	920208	120622.29	491.	-166.	1685.	-16.	21538	398
19960	62.90	110.96	-.0008	70 091 AY	191.73	920211		
	920210	211850.51	512.	-203.	-1799.	-5.	89298	221
19993	60.80	127.15	-.0144	64 006 W	340.48	920212		
	920211	035432.62	522.	260.	297.	-7.	86607	329
	920211	041232.53	695.	57.	-1240.	-14.	93903	396
	920211	041242.40	695.	32.	-1299.	20.	93903	396
19994	60.71	119.40	-.0092	64 006 X	234.20	920128		
	920201	222215.38	303.	-36.	296.	3.	19994	399
	920201	222241.41	294.	-35.	296.	3.	19994	399
	920201	222317.01	282.	-34.	297.	3.	19994	399
	920203	220516.73	303.	-117.	654.	3.	19994	399
	920203	220519.69	302.	-116.	654.	3.	19994	399
	920203	220536.86	296.	-115.	655.	3.	19994	399
	920204	215559.39	311.	-195.	891.	2.	19994	399
	920204	215621.84	302.	-193.	894.	2.	19994	399
	920204	215632.71	299.	-192.	895.	3.	19994	399
	920205	214636.98	315.	-304.	1157.	2.	19994	399
	920205	214705.85	304.	-332.	1161.	2.	19994	399
	920205	214736.91	293.	-300.	1165.	2.	19994	399
19995	60.86	118.59	-.0216	64 006 Y	110.74	920112		
	920205	121100.27	1061.	91.	1755.	17.	15390	398
	920211	074236.71	884.	-33.	-550.	1.	93925	396
20055	64.82	733.31	-.0093	89 043 O	316.52	920210		
	920211	123849.23	3662.	18.	694.	-24.	88629	334
	920211	053635.68	21096.	-1004.	7630.	6.	89812	232
20082	65.00	339.46	-.0002	89 039 H	51.15	920212		
	920211	083330.45	3542.	-2.	817.	-40.	89336	232
	920211	083352.26	3574.	-3.	760.	-33.	89336	232
20123	6.49	382.62	-.1306	69 053 B	291.94	920211		
	920211	165652.54	2785.	373.	-2370.	-44.	8547	334
	920211	165709.41	2753.	296.	-2391.	-5.	8547	334
	920211	225715.81	1328.	312.	-2780.	22.	94752	399
	920211	225812.65	1443.	296.	-2993.	40.	94752	399
	920211	225828.21	1474.	286.	-3053.	44.	94752	399
20127	7.99	631.45	-.0053	88 063 E	333.55	920209		
	920211	172857.63	4943.	-790.	-5457.	4.	90000	241
	920211	172923.67	5019.	-836.	-5560.	16.	90000	241
	920211	172952.42	5103.	-888.	-5673.	29.	90000	241
	920211	173019.24	5180.	-937.	-5778.	42.	90000	241
2012[illegible]	82.52	115.29	-.0024	78 100 AR	202.87	920211		
	920131	234032.22	930.	-5.	-904.	13.	88032	398
	920210	211856.51	700.	278.	340.	17.	89298	221
20131	90.32	111.18	.0003	65 027 BD	101.64	911203		
	920116	052633.12	700.	-369.	1728.	-10.	3899	396
20171	7.22	115.26	-.6425	89 062 D	325.13	920211		
	920211	090347.41	1017.	-9.	1.	-7.	90436	385
	920211	090357.40	10[illegible].	-4.	0.	-3.	90436	385
	920211	090427.59	1046.	-2.	2.	-1.	90436	385
	920211	090437.63	1055.	1.	0.	1.	90436	385
	920211	090447.68	1060.	0.	-0.	0.	90436	385
	920211	090457.72	1066.	1.	-0.	1.	90436	385

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
	920211	090507.77	1072.	1.	-1.	1.	90436	385
	920211	090517.82	1078.	2.	-0.	2.	90436	385
	920211	090527.65	1034.	2.	-0.	2.	90436	385
	920211	090537.90	1089.	2.	0.	2.	90436	385
	920211	090645.29	1124.	1.	-3.	1.	90437	385
	920211	090655.34	1131.	6.	-2.	3.	90437	385
	920211	090705.38	1135.	1.	-1.	1.	90437	385
	920211	090725.47	1145.	1.	-0.	1.	90437	385
	920211	090735.51	1149.	0.	1.	1.	90437	385
	920211	090755.60	1160.	0.	2.	1.	90437	385
	920211	090805.65	1165.	0.	2.	1.	90437	385
	920211	090946.74	1204.	-10.	1.	-9.	90438	385
20258	63.70	698.33	-.0008	89 078 0	44.70	920210		
	920211	082926.77	3971.	-1320.	6123.	-22.	89336	232
	920211	083016.70	3991.	-1220.	5998.	-34.	89336	232
	920211	083054.25	4008.	-1151.	5906.	-41.	89336	232
	920211	083121.75	4023.	-1104.	5839.	-46.	89336	232
	920211	084459.95	4906.	-326.	4093.	-44.	89336	232
	920211	084538.84	4963.	-305.	4018.	-41.	89336	232
	920211	084608.24	5007.	-290.	3961.	-39.	89336	232
	920211	084639.85	5055.	-274.	3900.	-37.	89336	232
	920211	085524.11	5909.	-64.	2891.	-14.	89336	232
	920211	085601.02	5972.	-53.	2890.	-14.	89336	232
	920211	085640.36	6039.	-41.	2743.	-14.	89336	232
	920211	085711.05	6092.	-33.	2683.	-15.	89336	232
	920211	085815.60	6204.	-15.	2557.	-13.	89336	232
	620211	085851.19	6265.	-6.	2487.	-20.	89336	232
	920211	085934.81	6341.	4.	2402.	-22.	89336	232
	920211	090006.51	6396.	12.	2339.	-24.	89336	232
20261	82.59	115.55	-.0002	89 080 A	203.88	920212		
	920210	234322.80	1029.	-4.	-5.	-8.	90406	385
	920210	234342.89	1037.	-4.	-5.	-9.	90406	385
	920210	234352.93	1044.	-1.	-4.	-5.	90406	385
	920210	234402.98	1049.	-0.	-4.	-4.	90406	385
	920211	182730.53	406.	98.	455.	11.	95201	393
20262	82.59	115.72	-.0002	89 080 C	204.65	920211		
	920128	233141.60	664.	-420.	-1321.	-8.	88892	398
	920211	205718.99	456.	-163.	1081.	-3.	94000	396
	920211	205728.86	456.	-168.	1074.	19.	94000	396
20281	82.59	115.48	-.0001	89 080 B	203.38	920212		
	920210	202258.95	755.	397.	653.	-14.	89207	221
20282	65.65	114.72	-.0002	76 067 BV	242.52	920211		
	920211	144236.15	1017.	-124.	844.	-14.	90236	383
20303	35.65	98.75	-.0009	89 085 B	280.17	920212		
	920211	030700.21	273.	-222.	284.	-9.	90643	383
	920211	030706.66	277.	-213.	294.	-1.	90643	383
	920211	030707.99	278.	-218.	296.	0.	90643	383
20307	82.07	109.21	-.0097	78 100 AS	169.50	920211		
	920213	071938.63	1055.	-118.	1504.	-15.	93922	396
20308	82.67	114.81	-.0024	78 100 AT	209.71	920211		
	920211	132010.39	963.	363.	-1622.	-4.	90233	383
	920211	191058.55	482.	165.	-114.	-15.	95223	393
20330	62.79	717.52	.0111	89 091 A	237.06	920211		
	920211	090946.74	1204.	153.	-610.	-19.	90438	385

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
20333	63.24	705.20	-.0006	89 091 D	205.78	920211		
	920210	232803.48	2875.	447.	-2676.	49.	89413	242
	920211	110649.27	338.	-1031.	1174.	-19.	94716	399
20399	46.89	483.66	-.0184	89 101 E	3.41	920210		
	920211	060043.22	13942.	-624.	3166.	32.	89376	232
	920211	060107.15	13933.	-019.	3144.	48.	89376	232
20406	26.71	331.33	-.0202	90 001 F	15.68	920212		
	920210	224624.95	3626.	-480.	-5303.	-38.	89413	242
20465	82.50	97.48	-.0005	90 010 A	358.03	920211		
	920211	080517.12	357.	-373.	-1647.	-7.	94707	399
20488	7.44	314.55	-.0496	88 063 F	276.88	920208		
	920129	235511.74	970.	673.	-588.	-23.	88788	398
	920129	235554.87	894.	615.	-644.	10.	88788	398
20510	82.52	97.51	-.0005	90 018 A	259.32	920212		
	920211	011134.04	336.	-278.	-1397.	-9.	94679	399
20557	73.96	117.78	.0000	90 029 J	133.83	920211		
	920211	094223.80	801.	10.	32.	4.	89832	233
20559	30.74	597.18	-.0479	90 030 B	139.12	920210		
	920210	200459.89	17076.	-930.	-3871.	-5.	82080	222
	920210	200554.17	17059.	-923.	-3845.	-47.	82080	222
	920210	205543.87	17037.	-928.	8640.	-30.	89207	221
20572	18.62	414.60	-.1992	90 034 C	31.10	920211		
	920211	125034.71	9662.	565.	-5113.	-33.	83410	369
	920211	125034.71	9662.	565.	-5113.	-33.	83421	369
	920211	125102.11	9706.	638.	-5143.	-15.	83410	369
	920211	125102.11	9706.	638.	-5143.	-15.	83421	369
	920211	125135.21	9758.	723.	-5182.	3.	83410	369
	920211	125135.21	9758.	723.	-5182.	3.	83421	369
	920211	125204.88	9804.	799.	-5218.	18.	83410	369
	920211	125204.88	9804.	799.	-5218.	18.	83421	369
	920211	125242.03	9863.	895.	-5260.	40.	83410	369
	920211	125242.03	9863.	695.	-5260.	40.	83421	369
	920211	000143.45	2177.	40.	2534.	-10.	88856	399
20578	82.94	104.71	-.0001	90 036 B	26.40	920212		
	920206	095138.79	540.	1.	-283.	11.	15390	398
20581	73.99	89.76	-.0859	90 038 A	70.37	920212		
	920211	105114.03	127.	-194.	1113.	9.	94117	393
	920211	183338.67	121.	-72.	606.	1.	82081	393
	920211	183414.27	124.	-46.	457.	0.	82061	393
	920211	183429.73	121.	-72.	608.	1.	82083	393
	920211	183437.73	127.	-31.	347.	-0.	82062	393
	920211	183437.80	127.	-33.	365.	-1.	82060	393
	920211	183449.70	128.	-25.	294.	-1.	82063	393
	920211	183505.27	125.	-46.	458.	0.	82061	393
	920211	183519.73	121.	-73.	610.	0.	82081	393
	920211	183528.97	127.	-33.	366.	-2.	82060	393
	920211	183529.03	127.	-31.	348.	-1.	82062	393
	920211	183540.87	129.	-25.	296.	-1.	82063	393
	920211	183555.27	125.	-45.	460.	-0.	82061	393
	920211	183609.77	121.	-73.	612.	0.	82081	393
	920211	183618.97	127.	-33.	367.	-1.	82060	393
	920211	183619.63	127.	-31.	349.	-0.	82062	393
	920211	183630.87	128.	-25.	297.	-1.	82063	393

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG AU	R.A. AV	EPOCH AW	TAG	SENSOR
	920211	183645.27	125.	-46.	461.	-0.	82061	393
	920211	183659.87	121.	-73.	614.	0.	82081	393
	920211	183708.97	128.	-33.	369.	-1.	82060	393
	920211	183709.03	128.	731.	350.	-0.	82062	393
	920211	183720.87	129.	-25.	298.	-1.	82063	393
	920211	183735.50	125.	-47.	463.	-0.	82061	393
	920211	183759.13	128.	-33.	370.	-1.	82060	393
	920211	183759.23	128.	-31.	352.	0.	82062	393
	920211	183811.07	129.	-25.	299.	-1.	82063	393
	920211	153245.25	133.	-20.	286.	-2.	90020	329
	920211	170043.38	134.	-16.	245.	-5.	90000	329
20586	63.11	733.11	.0028	90 039 D	98.15	920209		
	920211	075840.02	5100.	-154.	-2240.	23.	89871	231
	920211	075859.00	5218.	-161.	-2296.	12.	89871	231
	920211	075921.67	5270.	-170.	-2356.	-1.	89871	231
20596	62.92	717.88	.0070	90 040 A	245.90	920211		
	920211	113638.66	985.	-22.	-62.	-0.	90447	385
	920211	113648.71	1001.	-21.	-61.	1.	90447	385
	920211	113658.87	1017.	-20.	-61.	2.	90447	385
	920211	113708.90	1033.	-20.	-62.	3.	90447	385
	920211	113718.95	1048.	-20.	-62.	3.	90447	385
	920211	113728.99	1062.	-21.	-63.	1.	90447	385
	920211	113739.04	1078.	-22.	-61.	1.	90447	385
	920211	113749.08	1094.	-22.	-61.	1.	90447	385
	920211	113809.17	3126.	-22.	-60.	2.	90447	385
	920211	113819.22	1142.	-23.	-60.	2.	90447	385
	920211	113849.79	1195.	-20.	-64.	6.	90225	382
	920211	113859.83	1211.	-22.	-63.	4.	90225	382
	920211	113900.48	1212.	-22.	-65.	5.	90226	382
	920211	113909.87	1229.	-20.	-63.	6.	90225	382
	920211	113920.57	1248.	-23.	-62.	6.	90226	382
	920211	113930.07	1262.	-23.	-60.	4.	90225	382
	920211	113930.61	1264.	-22.	-62.	5.	90226	382
	920211	113940.11	1280.	-22.	-61.	5.	90225	382
	920211	113940.65	1281.	-21.	-61.	6.	90226	382
	920211	113950.25	1296.	-23.	-50.	4.	90225	382
	920211	113950.69	1299.	-21.	-61.	6.	90226	382
	920211	114000.31	1313.	-24.	-50.	3.	90225	382
	920211	114020.50	1349.	-25.	-59.	3.	90225	382
	920211	114020.83	1353.	-21.	-60.	7.	90226	382
20624	71.03	101.93	-.0001	90 046 A	127.66	920211		
	920211	153935.33	458.	-311.	1526.	-4.	86767	329
20646	62.93	717.76	.0064	90 052 A	141.27	920211		
	920211	052042.33	18636.	-207.	15784.	-5.	83421	334
20662	.08	1432.69	0.0000	90 054 0	290.52	920210		
	920211	085933.98	19228.	-49.	533.	16.	90000	951
	920211	085949.03	19228.	-49.	533.	16.	90000	951
	920211	090003.68	19228.	-49.	532.	16.	90000	951
	920211	090018.48	19228.	-49.	532.	16.	90000	951
20669	24.51	669.91	-.0178	90 056 C	52.92	920211		
	920211	031608.99	440.	-623.	-620.	28.	94687	399
	920211	031640.59	448.	-672.	-592.	39.	94687	399
	920211	031659.72	454.	-702.	-574.	45.	94687	399
20672	26.72	535.37	-.0014	67 001 AT	101.33	920107		
	920201	114236.23	787.	65.	-158.	5.	20672	398
	920201	114357.08	674.	61.	-165.	3.	20672	398

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
	920201	114549.92	537.	54.	-174.	1.	20672	398
	920204	111014.06	200.	-527.	-1542.	-6.	88079	398
	920204	111031.90	207.	-513.	-1554.	43.	88079	398
	920211	120805.44	5534.	-1007.	-6097.	-37.	83999	222
	920211	120844.16	5493.	-1025.	-6142.	-34.	83999	222
	920211	121000.75	5413.	-1062.	-6232.	-30.	83999	222
	920211	121038.61	5376.	-1082.	-6279.	-28.	83999	222
	920211	121159.66	5299.	-1128.	-6383.	-24.	83999	222
20674	7.16	600.41	0.0000	84 081 E	324.79	920208		
	920211	172039.88	18710.	-805.	9999.	-1.	83410	369
	920211	172039.88	18710.	-605.	9999.	-1.	83421	369
	920211	072931.29	1249.	-422.	2580.	-11.	90233	388
	920211	072941.34	1270.	-384.	2582.	-25.	90233	388
	920211	072951.39	1288.	-346.	2580.	-42.	90233	388
20704	46.97	490.31	.0280	90 054 E	69.41	920211		
	920211	090056.60	13635.	-1040.	-4360.	-3.	89832	232
	920211	090126.29	13622.	-1038.	-4358.	-39.	89832	232
20717	3.72	635.39	-.0126	90 063 C	239.27	920209		
	920211	025439.64	1096.	-23.	-645.	-44.	90198	383
	920211	025459.73	1129.	49.	-648.	-29.	90198	383
	920211	025509.77	1146.	84.	-553.	-22.	90198	383
	920211	025529.86	1180.	155.	-663.	-6.	90198	383
	920211	025539.90	1197.	390.	-667.	1.	90198	393
20742	62.95	717.80	-.0007	90 071 A	139.30	920211		
	920211	174937.89	10342.	88.	-2438.	-22.	21854	399
	920211	175314.87	10342.	453.	-2338.	-45.	21854	399
20775	82.96	107.94	-.0044	90 078 8	231.24	920212		
	920211	183000.53	406.	-299.	255.	12.	95201	393
20799	10.72	1431.63	0.0000	77 048 G	48.89	911020		
	920210	224446.40	18697.	-69.	-1809.	-31.	89413	242
	920210	224519.31	18898.	-69.	-1812.	-29.	89413	242
	920210	224554.37	18899.	-69.	-1814.	-26.	89413	242
	920210	224624.95	18899.	-70.	-1817.	-23.	89413	242
	920210	225947.88	18916.	-77.	-1877.	44.	89413	242
	920210	230020.69	18917.	-77.	-1880.	46.	89413	242
20805	82.93	104.72	-.0000	90 083 8	88.38	920212		
	920124	052920.50	515.	-17.	-294.	-3.	12102	385
20827	82.53	104.08	-.0000	90 086 B	107.28	920211		
	920211	031835.67	493.	-376.	-1635.	-4.	94687	399
20833	79.69	91.24	-2.2401	65 098 K	325.74	920210		
	920211	201906.84	201.	-278.	1593.	7.	90249	383
20946	.02	1436.12	0.0000	90 100 B	295.29	920211		
	920211	085933.98	19327.	3.	-44.	-6.	90000	951
	920211	085949.03	19327.	3.	-44.	-6.	90000	951
	920211	090003.68	19327.	3.	-44.	-6.	90000	951
	920211	090018.48	19327.	3.	-44.	-6.	90000	951
20947	7.71	616.72	-.0290	90 100 C	29.40	920211		
	920211	080512.09	1284.	-1.	0.	0.	94236	399
	920211	080606.75	1173.	-1.	-1.	1.	94236	399
	920211	080706.10	1057.	-0.	-0.	1.	94236	399
	920211	080806.49	942.	-0.	-0.	1.	94236	399
	920211	080906.00	834.	-1.	1.	1.	94236	399

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH		
	DATE	TIME	ALT	ΔU	ΔV	ΔW	TAG	SENSOR
	920211	081006.66	728.	-1.	0.	0.	94235	399
20962	11.77	1412.68	0.0000	75 100 F	42.71	920211		
	920210	224923.21	19252.	-1962.	10454.	-19.	89416	242
	920210	224954.97	19253.	-1961.	10452.	-14.	89416	242
	920210	225040.46	19254.	-1960.	10449.	-8.	89416	242
	920210	225117.77	19255.	-1959.	10447.	-3.	89416	242
	920210	225302.73	19258.	-1956.	10440.	12.	89417	242
	920210	225336.57	19258.	-1956.	10439.	16.	89417	242
	920210	225410.08	19259.	-1955.	10436.	21.	89417	242
	920210	225448.37	19260.	-1954.	10433.	26.	89417	242
21011	64.87	675.24	0.0000	90 110 F	138.17	920209		
	920211	022437.88	10305.	-526.	-3699.	46.	21854	369
	920211	022512.38	10305.	-526.	-3697.	45.	21854	369
	920211	022554.38	10305.	-526.	-3597.	45.	21854	369
	920211	022627.02	10305.	-526.	-3698.	46.	21854	369
	920211	022659.99	10305.	-526.	-3698.	47.	21854	369
	920211	022740.76	10305.	-526.	-3697.	45.	21854	369
	920211	022813.91	10305.	-526.	-3698.	44.	21854	369
	920211	022838.87	10305.	-526.	-3697.	44.	21854	369
	920211	022911.54	10305.	-526.	-3697.	45.	21854	369
	920211	022936.74	10305.	-526.	-3696.	45.	21854	369
	920211	023010.85	10305.	-526.	-3697.	45.	21854	369
	920211	023037.46	10305.	-526.	-3697.	45.	21854	369
	920211	023102.33	10305.	-526.	-3697.	44.	21854	369
	920211	023127.17	10305.	-526.	-3697.	44.	21854	369
	920211	023152.07	10305.	-526.	-3696.	44.	23854	369
	920211	023208.99	10305.	-525.	-3696.	45.	21854	369
	920211	023246.49	10305.	-526.	-3696.	44.	21854	369
	920211	023312.71	10305.	-525.	-3696.	43.	21854	369
	920211	023346.94	10305.	-525.	-3695.	44.	21854	369
	920211	023416.01	10305.	-525.	-3694.	43.	21854	369
	920211	030327.21	10306.	-522.	-3685.	32.	21854	369
	920211	030353.06	10306.	-522.	-3684.	33.	21854	369
	920211	030440.74	10306.	-522.	-3584.	33.	21854	369
	920211	030512.72	10306.	-522.	-3684.	33.	21854	369
	920211	030543.80	10306.	-522.	-3684.	32.	21854	369
	920211	030608.63	10306.	-522.	-3684.	32.	21854	369
	920211	030639.26	10306.	-521.	-3683.	32.	21854	369
	920211	030710.23	10306.	-521.	-3683.	33.	21854	369
	920211	030741.14	10306.	-521.	-3684.	32.	21854	369
	920211	030819.11	10306.	-521.	-3684.	32.	21854	369
	920211	030916.93	10306.	-521.	-3684.	31.	21854	369
	920211	031003.22	10306.	-521.	-3683.	31.	21854	369
	920211	031034.16	10306.	-521.	-3682.	30.	21854	369
	920211	031105.07	10306.	-521.	-3681.	30.	21854	369
	920211	031136.06	10306.	-520.	-3680.	30.	21854	369
	920211	035325.95	10311.	-512.	-3565.	10.	21854	369
	920211	035421.37	10311.	-512.	-3665.	11.	21854	369
	920211	035502.62	10312.	-512.	-3667.	12.	21854	369
	920211	035530.55	10312.	-512.	-3667.	13.	21854	369
	920211	035558.37	10312.	-511.	-3667.	13.	21854	369
	920211	035639.62	10312.	-511.	-3667.	13.	21854	369
	920211	035721.07	10312.	-511.	-3668.	12.	21854	369
	920211	035816.75	10312.	-511.	-3668.	11.	21854	369
	920211	035911.97	10312.	-511.	-3666.	10.	21854	369
	920211	040006.30	10312.	-511.	-3666.	9.	21854	369
	920211	040101.95	10312.	-511.	-3666.	9.	21854	369
	920211	040145.12	10313.	-510.	-3666.	9.	21854	369
	920211	040214.22	10313.	-510.	-3667.	8.	21854	369
	920211	040242.32	10313.	-510.	-3667.	7.	21854	369
	920211	040311.82	16313.	-510.	-3667.	7.	21854	369

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH		
	DATE	TIME	ALT	ΔU	ΔV	ΔW	TAG	SENSOR
	920211	041331.80	10316.	-505.	-3659.	1.	21854	404
	920211	041412.94	10313.	-511.	-3669.	12.	21854	404
	920211	041454.07	10317.	-504.	-3658.	-8.	21854	404
	920211	041535.20	10316.	-506.	-3661.	-1.	21854	404
	920211	041616.34	10315.	-511.	-3678.	-17.	21854	404
	920211	041657.47	10316.	-508.	-3668.	-8.	21854	404
	920211	041738.61	10315.	-507.	-3665.	-2.	21854	404
	920211	041819.74	10315.	-509.	-3570.	-3.	21854	404
	920211	041900.87	10315.	-530.	-3674.	-9.	21854	404
	920211	041942.01	10317.	-505.	-3663.	-12.	21854	404
	920211	042023.14	10315.	-509.	-3667.	2.	21854	404
	920211	042104.28	10313.	-513.	-3678.	-0.	21854	404
	920211	042145.41	10315.	-510.	-3675.	-9.	21854	404
	920211	042226.55	10318.	-501.	-3650.	0.	21854	404
	920211	042307.68	10315.	-509.	-3668.	2.	21854	404
	920211	042348.81	10316.	-509.	-3673.	-9.	21854	404
	920211	042429.95	10315.	-509.	-3670.	-1.	21854	404
	920211	042511.08	10314.	-510.	-3672.	3.	21854	404
	920211	042552.22	10315.	-510.	-3676.	-7.	21854	404
	920211	042633.35	10312.	-518.	-3689.	4.	21854	404
	920211	050100.73	10324.	-497.	-3660.	-16.	21854	369
	920211	050142.24	10324.	-496.	-3659.	-18.	21854	369
	920211	050213.09	10324.	-496.	-3659.	-19.	21854	369
	920211	050242.85	10324.	-496.	-3659.	-19.	21854	369
	920211	050313.59	10324.	-496.	-3659.	-19.	21854	369
	920211	050350.93	10325.	-495.	-3659.	-19.	21854	369
	920211	050435.26	10324.	-496.	-3658.	-13.	21854	369
	920211	050515.15	10325.	-496.	-3658.	-19.	21854	369
	920211	050552.43	10325.	-495.	-3657.	-20.	21854	369
	920211	050629.74	10325.	-495.	-3658.	-22.	21854	369
21013	65.08	340.15	-.0008	90 110 H	354.77	920211		
	920211	031136.06	10306.	-475.	-4734.	-16.	21854	369
21049	25.27	635.79	.0020	91 001 C	167.08	920210		
	920211	175348.96	18398.	739.	9999.	25.	83410	369
	920211	175348.96	18398.	739.	9999.	25.	83421	369
21057	6.59	599.86	-.0628	91 003 C	105.50	920210		
	920209	120409.88	1410.	526.	-2482.	-21.	15390	398
21058	6.87	510.78	-.2442	91 003 D	89.73	920211		
	920209	120544.80	1568.	78.	-3379.	-43.	15390	398
	920211	060621.80	3360.	-0.	10.	-1.	90839	399
	920211	060717.22	3239.	1.	-1.	1.	90839	399
	920211	060818.51	3104.	0.	-1.	-0.	90839	399
	920211	060916.96	2975.	0.	1.	1.	90839	399
	920211	061020.03	2835.	-0.	1.	0.	90839	399
	920211	061125.36	2690.	-0.	2.	1.	90839	399
21087	82.94	104.77	-.0000	91 006 A	56.26	920212		
	920211	004827.72	523.	-4.	-29.	-8.	81575	399
21115	74.04	118.47	-.0000	91 009 M	97.73	920211		
	920211	084013.83	799.	-83.	-375.	9.	89832	232
	920211	084036.55	805.	-86.	-472.	5.	89832	232
	920211	084103.66	814.	-85.	-564.	4.	89832	232
	920211	084126.91	828.	-83.	-656.	6.	89832	232
21128	66.04	116.56	-.0004	76 067 BY	56.15	920212		
	920211	053635.68	504.	-175.	355.	-9.	89812	232
	920211	053724.35	552.	-128.	216.	-15.	89812	232
	920211	053749.34	587.	-96.	152.	-18.	89812	232

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
	920211	053816.92	632.	-56.	84.	-20.	89812	232
21137	74.04	118.23	-.0000	91 009 P	94.57	920212		
	920209	024851.13	830.	-396.	-1740.	20.	15390	398
21141	6.38	580.41	-.2680	91 015 C	181.00	920211		
	920114	201849.91	1086.	-37.	2778.	34.	21692	398
	920114	201914.79	1042.	-51.	2699.	-9.	21692	398
	920114	201939.79	1000.	-67.	2623.	-50.	21692	398
21150	24.96	99.90	-.0030	91 018 B	52.97	920211		
	920208	120547.77	544.	-328.	2129.	-15.	21538	398
	920211	075734.75	422.	113.	343.	-0.	89871	231
	920211	075840.02	291.	6.	72.	10.	89871	231
	920211	075859.00	282.	2.	-7.	9.	89871	231
	920211	075921.67	295.	17.	-92.	6.	89871	231
	920211	011328.18	418.	58.	359.	6.	94679	399
21152	82.92	104.85	-.0000	91 019 A	241.26	920212		
	920205	130558.03	515.	-57.	-627.	12.	88079	398
21162	73.97	117.29	0.0000	91 009 Z	85.36	920211		
	920211	191146.42	784.	-156.	1155.	-2.	95222	393
21164	74.04	117.85	0.0000	91 009 AB	91.92	920211		
	920211	084216.45	876.	-204.	1358.	-10.	89336	232
21181	73.95	117.91	0.0000	91 009 AD	89.70	920211		
	920211	065941.67	861.	-91.	853.	-13.	89810	232
	920211	070005.41	835.	-96.	752.	-7.	89810	232
	920211	070028.92	814.	-99.	655.	-2.	89810	232
	920211	070052.18	798.	-100.	562.	0.	89810	232
21182	74.00	118.01	-.0000	91 009 AV	92.08	920211		
	920211	121159.66	892.	-85.	-1084.	2.	83999	222
21185	74.02	118.43	.0000	93 009 AY	96.07	920211		
	920211	073846.40	833.	-32.	41.	10.	89324	232
	920211	073912.36	877.	15.	-19.	-6.	89324	232
21196	62.93	717.68	0.0000	91 022 A	264.13	920211		
	920114	105316.72	7526.	19.	3811.	-34.	17253	334
	920211	083534.22	7803.	25.	894.	31.	90000	232
21211	74.10	118.21	-.0001	91 009 BE	96.11	920211		
	920211	063534.22	788.	-90.	-385.	21.	90000	232
21223	3.68	635.43	-.0143	91 026 B	239.50	920211		
	920128	114546.87	1009.	-209.	-1323.	-40.	21223	383
	920211	144226.11	1037.	-3.	-13.	13.	90236	383
	920211	144236.15	1017.	-4.	-6.	8.	90236	383
	920211	144246.19	997.	-5.	-4.	5.	90236	383
	920211	144256.24	977.	-6.	-4.	4.	90236	383
	920211	144306.28	960.	-5.	-2.	4.	90236	383
	920211	144336.41	907.	-3.	1.	3.	90236	383
	920211	144346.45	889.	-3.	2.	3.	90236	383
	920211	144406.54	855.	-2.	3.	3.	90236	383
	920211	144416.59	837.	-3.	4.	2.	90236	383
	920211	144426.63	819.	-3.	5.	1.	90[illegible]	383
21250	74.06	318.25	.0000	91 009 BH	95.67	920211		
	920211	090006.51	906.	43.	-57.	-21.	89336	232

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH		
	DATE	TIME	ALT	ΔU	ΔV	ΔW	TAG	SENSOR
21277	99.66	109.35	-.0000	75 052 N	240.60	920212		
	920211	194454.98	613.	-14.	195.	-13.	86783	329
21282	99.68	108.81	-.0000	75 052 T	244.09	920212		
	920211	193756.79	638.	0.	541.	-0.	90000	329
21318	99.56	106.00	-.0022	75 052 AL	256.48	920212		
	920211	060157.17	475.	39.	59.	15.	89376	232
21324	99.57	111.50	-.0008	75 052 AS	226.32	920212		
	920211	101030.77	745.	-104.	-154.	-21.	94714	399
21326	99.68	107.62	-.0000	75 052 AO	251.10	920212		
	920201	003122.15	590.	-121.	949.	-0.	88788	398
21338	99.49	107.99	-.0001	75 052 BG	243.06	920212		
	920211	111745.94	657.	22.	569.	-17.	94717	399
21339	99.55	113.29	-.0001	75 052 BH	216.89	920212		
	920211	223152.10	910.	30.	1529.	-17.	94747	399
21340	99.54	113.39	-.0073	75 052 BJ	215.32	920212		
	920128	233002.62	808.	-325.	-2076.	-18.	88892	398
21341	99.73	114.67	0.0000	75 052 BK	215.53	920212		
	920131	233930.20	1024.	-6.	1608.	7.	88032	398
21346	99.33	112.42	-.0025	75 052 BQ	213.95	920212		
	920211	131930.21	885.	-389.	-1738.	-5.	90233	383
21360	99.67	108.38	-.0000	75 052 CE	246.40	920212		
	920211	195801.70	598.	-108.	-936.	12.	86698	329
21376	100.03	108.23	-.0070	75 052 CW	255.53	920211		
	920211	100402.07	498.	-226.	-589.	4.	93938	396
21390	99.88	109.57	-.0025	75 052 DL	244.42	920212		
	620211	052356.69	733.	-112.	-1467.	-10.	89812	232
	920211	193756.79	638.	-240.	-1395.	-8.	90000	329
21404	73.96	136.09	0.0000	91 009 BT	74.63	920212		
	920211	051401.39	886.	119.	-423.	18.	89810	232
	920211	051429.24	910.	132.	-529.	-7.	88810	232
21429	63.05	732.31	0.0000	91 043 D	316.14	920210		
	920211	052307.17	21335.	-32.	1450.	-35.	89812	232
	920211	052331.74	21326.	-34.	1435.	-10.	89812	232
	920211	052356.69	21317.	-35.	1421.	15.	89812	232
	920211	052419.81	21308.	-37.	1408.	38.	89812	232
21438	99.58	108.49	-.0001	75 052 DW	243.05	920212		
	920211	195137.60	609.	-70.	-826.	2.	86776	329
21444	99.64	111.66	-.0002	75 052 EC	227.63	920212		
	920209	115754.19	817.	-89.	-1036.	7.	15390	398
21446	99.67	113.40	-.0001	75 052 EE	219.81	920212		
	920211	104746.33	568.	-226.	-112.	-21.	15758	396
21447	100.22	117.38	-.0117	75 052 EF	214.28	920211		
	920210	201942.02	1221.	42.	-694.	9.	89207	221
21448	99.60	109.33	-.0000	75 052 EG	238.89	920212		

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH	TAG	SENSOR
	DATE	TIME	ALT	ΔU	ΔV	ΔW		
	920211	111637.67	642.	-140.	959.	-16.	94717	399
21452	99.75	118.02	-.0007	75 052 EL	201.12	920211		
	920210	223618.82	910.	-201.	318.	18.	90220	395
21461	99.61	109.31	-.0001	75 052 EV	239.52	920212		
	920211	113026.17	720.	-238.	-1747.	-19.	90223	382
21471	100.08	106.79	-.0003	75 052 FF	268.93	920212		
	920211	041222.66	695.	-383.	1941.	3.	93903	396
	920211	041232.53	695.	-349.	1874.	-10.	93903	396
21475	99.77	106.48	-.0001	75 052 FK	260.47	920211		
	920205	130558.03	515.	-133.	-550.	3.	88079	398
21491	99.01	104.58	-.0052	75 052 FL	245.90	920212		
	920211	121422.99	537.	-43.	-283.	12.	93329	399
21499	99.66	110.26	-.0002	75 052 FO	235.16	920212		
	920211	113507.79	696.	-36.	-523.	7.	94719	399
21506	99.58	110.22	-.0003	75 052 GB	233.29	920212		
	920131	234351.53	677.	-340.	1825.	-5.	88032	398
	920211	223404.43	735.	-7.	1100.	-3.	94750	399
21523	99.95	121.65	-.0774	75 052 GO	179.99	920130		
	920210	200720.38	1382.	146.	532.	14.	82080	222
21538	46.70	608.03	-.4623	91 046 E	211.36	920128		
	920117	033604.77	856.	-1070.	-1437.	9.	21538	329
	920117	033640.50	935.	-1061.	-3417.	-0.	21538	329
	920117	033716.22	1014.	-1051.	-1393.	1.	21538	329
	920131	030344.99	1022.	68.	184.	3.	21538	329
	920203	113048.14	235.	-546.	1199.	1.	21538	387
	920203	113050.09	233.	-545.	1200.	1.	21538	387
	920207	071500.69	7892.	1281.	1444.	-9.	21538	334
	920125	150400.32	72.	-24.	65.	-50.	21538	745
21552	55.33	716.01	.0000	91 047 A	111.87	920210		
	920211	172857.63	10918.	-798.	4673.	44.	90000	241
	920211	172923.67	10917.	-787.	4636.	22.	90000	241
	920211	172952.42	10616.	-775.	4596.	-2.	96000	241
	920211	173019.24	10915.	-764.	4560.	-24.	90000	241
	920211	173159.75	10911.	-712.	4388.	-34.	90001	241
21565	99.83	113.48	-.0003	75 052 HK	223.76	920211		
	920206	095345.03	700.	-207.	-423.	-13.	15390	398
21567	100.05	106.85	-.0002	75 052 HM	257.28	920212		
	920211	041032.30	704.	-98.	-1059.	5.	93902	396
	920211	041302.14	694.	-357.	-1725.	13.	93903	396
21594	16.56	593.16	.0038	90 065 K	176.84	920211		
	920208	215615.65	3890.	-841.	5255.	-9.	15390	398
21620	46.55	244.97	-.2953	87 100 G	127.81	920211		
	920211	144114.03	2841.	-224.	-4778.	24.	83999	221
21623	62.86	216.41	-.0131	87 036 L	193.30	920210		
	920211	090427.59	1046.	285.	479.	1.	90436	385
	920211	090437.63	1055.	308.	449.	-30.	90436	385
21635	18.24	584.84	-.0213	98 065 M	168.33	920211		

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
	920211	165652.54	2785.	-84.	-2297.	-26.	8547	334
	920211	165709.41	2753.	-155.	-2297.	-2.	8547	334
21656	82.56	109.35	.0001	91 056 B	1.38	920211		
	920126	083727.69	630.	-13.	15.	-13.	3899	745
21659	85.94	162.83	-.0033	63 014 FF	100.19	911130		
	920211	083904.72	3023.	-174.	-1185.	20.	89832	232
	920211	083927.32	3035.	-181.	-1248.	13.	89832	232
	920211	084013.83	3060.	-196.	-1379.	-2.	89832	232
	920211	084039.55	3075.	-204.	-1451.	10.	89832	232
	920211	084103.66	3089.	-212.	-1519.	-17.	89832	232
	920211	084126.91	3103.	-220.	-1584.	-24.	89832	232
21660	85.88	164.08	-.0004	63 014 FG	71.31	920204		
	920211	131426.94	2075.	-166.	-2709.	-18.	94593	399
21670	28.63	638.62	-.0141	91 060 C	81.74	920128		
	920210	195115.32	12943.	-918.	-5205.	-10.	89207	221
	920210	195202.62	12886.	-921.	-5206.	3.	89207	221
	920210	195250.54	12827.	-924.	-5208.	16.	89207	221
	920210	195337.45	12770.	-927.	-5209.	29.	89207	221
21678	99.95	111.10	-.0003	75 052 JE	239.39	920212		
	920211	111637.67	642.	-227.	-290.	10.	94717	399
21686	100.01	106.54	-.0014	75 052 JN	267.04	920211		
	920211	041302.14	694.	-157.	1381.	16.	93903	396
21691	89.64	100.54	-.0003	91 045 E	184.00	920211		
	920211	043739.26	444.	-331.	1618.	3.	86777	329
21692	27.42	461.85	-.0027	67 001 AU	165.89	920105		
	920114	201731.99	1225.	-152.	304.	-1.	21692	398
	920114	201825.03	1129.	-150.	312.	-1.	21692	398
	920114	201849.91	1086.	-147.	313.	-0.	21692	398
	920114	201914.79	1042.	-147.	318.	-1.	21692	398
	920114	201939.79	1000.	-145.	321.	-1.	21692	398
	920114	202005.10	957.	-143.	325.	-0.	21692	398
	920114	202030.50	616.	-142.	327.	-1.	21692	398
	920114	202056.60	875.	-139.	330.	0.	21692	398
	920114	202122.58	834.	-137.	334.	-0.	21692	398
	920114	202149.61	792.	-136.	336.	0.	21692	398
	920114	202222.47	744.	-131.	342.	1.	21692	398
21723	65.72	106.86	-.0024	71 015 OW	190.22	920211		
	920211	203747.63	362.	-279.	435.	-18.	4942	399
	920211	023536.23	644.	-10.	1424.	-12.	86797	329
	920211	023952.93	673.	173.	566.	-14.	86712	329
21743	73.99	93.53	-.0130	91 072 A	330.79	920231		
	920211	195434.07	354.	194.	257.	2.	82082	243
21764	40.99	615.37	-.4851	91 074 F	241.06	920208		
	920211	212636.05	4565.	147.	205.	-10.	21764	399
	920211	213727.27	5947.	140.	174.	-6.	21764	399
	920211	002941.04	666.	61.	208.	-1.	90000	329
	920211	002959.25	700.	65.	209.	0.	90001	329
21777	18.32	600.54	-.0011	90 065 O	189.74	920210		
	920211	123620.44	3330.	715.	4871.	29.	88629	334
	920211	123643.88	3381.	828.	4815.	26.	88629	334
	920211	123751.07	3531.	1133.	4642.	28.	88629	334

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
21819	82.57	121.62	-.0008	91 086 A	139.15	920712		
	920211	061450.98	281.	-0.	-81.	11.	87329	396
	920211	061501.05	283.	-0.	-81.	11.	87329	396
	920211	081725.53	313.	13.	169.	8.	87329	396
	920211	081735.39	317.	14.	168.	8.	87329	396
	920211	081745.26	320.	15.	168.	8.	87329	396
	920211	100911.49	409.	154.	-266.	-12.	89813	232
21827	82.51	121.42	-.0064	91 086 D	139.19	920211		
	920210	233944.99	519.	-319.	957.	-17.	90000	329
21834	31.06	110.72	-.0475	91 088 B	50.75	920212		
	920210	093716.01	316.	58.	-998.	-14.	15390	398
	920210	093807.19	360.	96.	-1003.	13.	15390	398
21835	82.57	121.63	-.0016	91 086 E	139.16	920212		
	920211	061450.98	281.	7.	311.	11.	87329	396
	920211	061503.05	283.	8.	311.	11.	87329	396
	920211	081725.53	313.	-1.	563.	8.	87329	396
	920211	081735.39	317.	3.	562.	8.	87329	396
	920211	081745 26	320.	1.	561.	8.	87329	396
21839	100.07	100.49	-.0039	70 025 QK	203.95	920211		
	920210	200554.17	455.	49.	-433.	-11.	82080	222
21848	62.74	90.48	-.1693	92 003 B	20.64	920212		
	920204	111031.90	207.	-60.	-896.	-3.	88079	398
	920209	095244.27	186.	47.	365.	6.	88079	398
21854	64.82	668.22	-.0068	92 005 B	137.93	920206		
	920211	022437.88	10305.	-95.	-2152.	1.	21854	369
	920211	022512.38	10305.	-95.	-2151.	0.	21854	369
	920211	022554.38	10305.	-96.	-2152.	1.	21854	369
	920211	022627.02	10305.	-96.	-2154.	2.	21854	369
	920211	022659.99	10305.	-97.	-2155.	3.	21854	369
	920211	022740.76	10305.	-98.	-2155.	1.	21854	369
	920211	022813.91	10305.	-99.	-2156.	0.	21854	369
	920211	022838.87	10305.	-99.	-2155.	0.	21854	369
	920211	022911.54	10305.	-99.	-2156.	1.	21854	369
	920211	022936.74	10305.	-100.	-2156.	2.	21854	369
	920211	023010.85	10305.	-101.	-2157.	1.	21854	369
	920211	023037.46	10305.	-101.	-2158.	1.	21854	369
	920211	023102.33	10305.	-102.	-2158.	1.	21854	369
	920211	023127.17	10305.	-102.	-2159.	1.	21854	369
	920211	023152.07	10305.	-102.	-2359.	1.	21854	369
	920211	023208.99	10305.	-103.	-2158.	1.	21854	369
	920211	023246.49	10305.	-103.	-2160.	1.	21854	369
	920211	023312.71	10305.	-104.	-2160.	0.	21854	369
	920211	023346.94	10305.	-104.	-2160.	1.	21854	369
	920211	023416.01	10305.	-105.	-2159.	1.	21854	369
	920211	030327.21	10306.	-133.	-2176.	-2.	21854	369
	920211	030353.06	10306.	-133.	-2175.	-0.	21854	369
	920211	030440.74	10306.	-133.	-2176.	-1.	21854	369
	920211	030512.72	10306.	-134.	-2176.	-0.	21854	369
	920211	030543.80	10306.	-134.	-2176.	-1.	21854	369
	920211	030608.63	10306.	-135.	-2176.	-1.	21854	369
	920211	030639.26	10306.	-135.	-2176.	-1.	21854	369
	920211	030710.23	10306.	-135.	-2177.	0.	21854	369
	920211	030741.14	10306.	-136.	-2178.	0.	21854	369
	920211	030819.11	10306.	-136.	-2178.	-0.	21854	369
	920211	030916.93	30306.	-137.	-2178.	-0.	21854	369
	920211	031003.22	10306.	138.	-2177.	0.	21854	369
	920211	031034.16	10306.	-138.	-2177.	-1.	21854	369

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
	920211	031105.07	10306.	-138.	-2176.	-1.	21854	369
	920211	031136.06	10306.	-139.	-2176.	-1.	21854	369
	920211	035325.95	10311.	-163.	-2170.	-3.	21854	369
	920211	035421.37	10311.	-164.	-2170.	-2.	21854	369
	920211	035502.62	10312.	-164.	-2372.	-1.	21854	369
	920211	035530.55	10312.	-164.	-2172.	0.	21854	369
	920211	035558.37	10312.	-164.	-2172.	1.	21854	369
	920211	035639.62	10312.	-164.	-2172.	1.	21854	369
	920211	035721.07	10312.	-165.	-2173.	0.	21854	369
	920211	035816.75	10312.	-165.	-2172.	-0.	21854	369
	920211	035911.97	10312.	-165.	-2171.	-1.	21854	369
	920211	040006.30	10312.	-166.	-2171.	-1.	21854	369
	920211	040101.95	10312.	-166.	-2171.	-1.	21854	369
	920211	040145.12	10313.	-166.	-2171.	-1.	21854	369
	920211	040214.22	10313.	-167.	-2171.	-2.	21854	369
	920211	040242.32	10313.	-167.	-2171.	-2.	21854	369
	920211	040311.82	10313.	-167.	-2171.	-1.	21854	369
	920211	041331.80	10316.	-168.	-2161.	-3.	21854	404
	920211	041412.94	10313.	-173.	-2172.	8.	21854	404
	920211	041454.07	10317.	-167.	-2160.	-11.	21854	404
	920211	041535.20	10336.	-169.	-2163.	-4.	21854	404
	920211	041616.34	10315.	-172.	-2180.	-20.	21854	404
	920211	041657.47	10316.	-170.	-2169.	-10.	21854	404
	920211	041736.61	10315.	-171.	-2167.	-4.	21854	404
	920211	041819.74	10315.	-172.	-2171.	-5.	21854	404
	920211	041900.87	10715.	-173.	-2175.	-11.	21854	404
	920211	041942.01	10317.	-169.	-2164.	-13.	21854	404
	920211	042023.14	10315.	-173.	-2168.	1.	21854	404
	920211	042104.28	10313.	-176.	-2179.	-1.	21854	404
	920211	042145.41	10315.	-174.	-2176.	-10.	21854	404
	920211	042226.55	10318.	-167.	-2150.	1.	21854	404
	920211	042307.68	10315.	-174.	-2169.	2.	21854	404
	920211	042348.81	10316.	-174.	-7173.	-8.	21854	404
	920211	042429.95	10315.	-174.	-2169.	-0.	21854	404
	920211	042511.08	10314.	-176.	-2172.	5.	21854	404
	920211	042552.22	10315.	-175.	-2175.	-6.	21854	404
	920211	042633.35	10312.	-161.	-2189.	0.	21854	404
	920211	050100.73	10324.	-169.	-2144.	1.	21854	369
	920211	050142.24	10324.	-169.	-2143.	0.	21854	369
	920211	050213.09	10324.	-169.	-2143.	-0.	21854	369
	920211	050242.85	10324.	-169.	-2143.	-0.	21854	369
	920211	050313.59	10324.	-169.	-2142.	-0.	21854	369
	920211	050350.93	10325.	-169.	-2142.	0.	21854	369
	920211	050435.26	10324.	-168.	-2141.	1.	21854	369
	920211	050515.15	10325.	-168.	-2140.	1.	21854	369
	920211	050552.43	10325.	-168.	-2140.	3.	21854	369
	920211	050629.74	10325.	-168.	-2140.	-1.	21854	369
	920211	174937.89	10342.	-297.	-3073.	-4.	21854	399
	920211	175314.87	10342.	-295.	-3079.	-9.	21854	399
21855	64.83	675.32	0.0000	92 005 C	138.00	920208		
	920211	021948.96	10336.	7.	-365.	11.	21855	399
	920211	022310.84	10334.	5.	-374.	8.	21855	399
	920211	023045.83	10337.	7.	-368.	11.	21855	399
	920211	023517.83	10335.	4.	-373.	4.	21855	399
	920211	023724.93	10336.	5.	-364.	3.	21855	369
	920211	023810.46	10336.	6.	-365.	4.	21855	369
	920211	023855.39	10337.	6.	-364.	3.	21855	369
	920211	023940.69	10337.	5.	-364.	3.	21855	369
	920211	023942.32	10337.	6.	-362.	2.	21855	399
	920211	024024.89	10337.	5.	-365.	4.	21855	369
	920211	024054.78	10337.	6.	-364.	4.	21855	369
	920211	024124.70	10337.	6.	-364.	4.	21855	369

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
	920211	024155.61	10337.	5.	-364.	4.	21855	369
	920211	024227.47	10337.	6.	-364.	4.	21855	369
	920211	024258.58	10337.	6.	-3[illegible].	5.	21855	369
	920211	024300.64	10336.	5.	-363.	2.	21855	399
	920211	024328.63	10337.	6.	-364.	5.	21855	369
	920211	024613.63	10338.	7.	-368.	12.	21855	399
	920211	052003.77	10334.	-5.	-373.	-1.	21855	369
	920211	052054.18	10334.	-5.	-375.	-2.	21855	369
	920211	052118.50	10334.	-5.	-376.	-3.	21855	369
	920211	052149.09	10334.	-5.	-376.	-3.	21855	369
	920211	052220.36	10334.	-5.	-376.	-3.	21855	369
	920211	052250.49	10334.	-5.	-376.	-3.	21855	369
	920211	052327.89	10334.	-5.	-376.	-3.	21855	369
	920211	052406.71	10334.	-5.	-376.	-4.	21855	369
	920211	052435.60	10334.	-5.	-376.	-5.	21855	369
	920211	052506.65	10334.	-5.	-376.	-5.	21855	369
	920211	052543.75	10334.	-5.	-377.	-4.	21855	369
21858	64.81	675.38	0.0000	92 005 F	137.86	920211		
	920211	021948.96	10336.	-53.	-1323.	2.	21855	399
	920211	022310.84	10334.	-55.	-1332.	-1.	21855	399
	920211	023045.83	10337.	-53.	-1326.	3.	21855	399
	920211	023517.83	10335.	-55.	-1330.	-5.	21855	399
	920211	023724.93	10336.	-53.	-1322.	-5.	21855	369
	920211	023810.46	10336.	-53.	-1322.	-4.	21855	369
	920211	023855.39	10337.	-53.	-1321.	-5.	21855	369
	920211	023940.69	10337.	-53.	-1322.	-5.	21855	369
	920211	023942.32	10337.	-52.	-1319.	-6.	21855	399
	920211	024024.89	10337.	-53.	-1323.	-5.	21855	369
	920211	024054.78	10337.	-52.	-1322.	-4.	21855	369
	920211	024124.70	10337.	-52.	-1322.	-4.	21855	369
	920211	024155.61	10337.	-53.	-1322.	-5.	21855	369
	920211	024227.47	10337.	-52.	-1322.	-4.	21855	369
	920211	024258.58	10337.	-52.	-1321.	-3.	21855	369
	920211	024300.64	10336.	-53.	-1321.	-6.	21855	399
	920211	024328.63	10337.	-52.	-1322.	-3.	21855	369
	920211	024613.63	10338.	-51.	-1326.	4.	21855	399
	920211	052003.77	10334.	-58.	-1348.	0.	21855	369
	920211	052054.18	10334.	-58.	-1350.	-0.	21855	369
	920211	052118.50	10334.	-58.	-1351.	-1.	21855	369
	920211	052149.09	10334.	-53.	-1351.	-1.	21855	369
	920211	052220.36	10334.	-58.	-1351.	-1.	21855	369
	920211	052250.49	10334.	-58.	-1351.	-1.	21855	369
	920211	052327.89	10334.	-58.	-1353.	-2.	21855	369
	920211	052405.71	10334.	-58.	-1351.	-2.	21855	369
	920211	052435.60	10334.	-59.	-1352.	-3.	21855	369
	920211	052506.65	10334.	-59.	-1352.	-3.	21855	369
	920211	052543.75	10334.	-59.	-1353.	-2.	21855	369
21859	3.67	133.83	-.3288	71 096 C	235.32	920211		
	920211	173725.84	1025.	448.	1089.	-18.	90003	241
	920211	174433.94	979.	130.	-688.	-21.	89417	242
	920211	174443.66	1004.	143.	-714.	-15.	89415	241
	920211	174459.73	1045.	156.	-797.	-6.	89417	242
	920211	174508.59	1068.	168.	-819.	-0.	89415	241
	920211	174525.20	1112.	180.	-906.	10.	89417	242
21860	51.72	265.66	-.8716	83 127 L	251.28	920207		
	920211	225929.42	1601.	590.	-1601.	-23.	94752	399
21869	73.99	89.84	-.0854	90 36 N	71.77	920211		
	920211	183414.27	124.	-50.	497.	-0.	82061	393
	920211	183437.73	127.	734.	387.	-1.	82062	393

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
	920211	183437.80	127.	-36.	405.	-2.	82060	393
	920211	183449.70	128.	-27.	334.	-1.	82063	393
	920211	183505.27	125.	-50.	498.	-1.	82061	393
	920211	183528.97	127.	-35.	4061	-2.	82060	393
	920211	183529.03	127.	-33.	388.	-1.	82062	393
	920211	183540.87	129.	-27.	335.	-1.	82063	393
	920211	183555.27	125.	-50.	499.	-1.	82061	393
	920211	183618.97	127.	-36.	407.	-2.	82060	393
	920211	183619.03	127.	-33.	389.	-1.	82062	393
	920211	183630.87	128.	-27.	336.	-2.	82063	393
	920211	183645.27	125.	-50.	501.	-1.	82061	393
	920211	183708.97	128.	-35.	408.	-2.	82060	393
	920211	183709.03	128.	-33.	390.	-1.	82062	393
	920211	183720.87	129.	-27.	337.	-2.	82063	393
	920211	183735.50	125.	-50.	502.	-1.	82061	393
	920211	183759.13	128.	-35.	409.	-2.	82060	393
	920211	183759.23	128.	-34.	391.	-1.	82062	393
	920211	183811.07	129.	-27.	338.	-2.	82063	393
	920211	153245.25	133.	-21.	313.	-2.	90020	329
	920211	170643.38	134.	-17.	278.	-6.	90000	329
	920211	105114.03	127.	-197.	1120.	10.	94117	395
21870	73.98	89.75	-.0931	90 38 P	71.60	920211		
	920211	105114.03	127.	-197.	1124.	10.	94117	393
	920211	183338.67	121.	-60.	550.	1.	82081	393
	920211	183414.27	124.	-36.	400.	1.	82061	393
	920211	183429.73	121.	-60.	552.	1.	82081	393
	920211	183437.73	127.	-23.	289.	0.	82062	393
	920211	183437.80	127.	-24.	308.	-1.	82060	393
	920211	183449.70	128.	-18.	237.	-0.	82063	393
	920211	183505.27	125.	-36.	401.	1.	82061	393
	920211	183519.73	121.	-60.	553.	1.	82081	393
	920211	183528.97	127.	-24.	309.	-1.	82060	393
	920211	183529.03	127.	-23.	290.	-0.	82062	393
	920211	183540.87	129.	-18.	238.	-0.	82063	393
	920211	183555.27	125.	-36.	402.	1.	82061	393
	920211	183609.77	121.	-60.	555.	1.	82081	393
	920211	183618.97	127.	-24.	309.	-1.	82060	393
	920211	183619.03	127.	-23.	291.	0.	82062	393
	920211	183636.87	128.	-18.	239.	-0.	82063	393
	920211	183645.27	125.	-36.	403.	0.	82061	393
	920211	183659.87	121.	-61.	556.	1.	82081	393
	920211	183708.97	128.	-24.	310.	-1.	82060	393
	920211	183709.03	128.	-23.	292.	0.	82062	393
	920211	183720.87	129.	-18.	239.	-0.	82063	393
	920211	183735.50	125.	-36.	405.	0.	82061	393
	920211	183759.13	128.	-24.	311.	-1.	82060	393
	920211	183759.23	128.	-23.	293.	0.	82062	393
	920211	183811.07	129.	-18.	240.	-0.	82063	393
	920211	153245.25	133.	-15.	256.	-1.	90020	329
	920211	170643.38	134.	-10.	200.	-5.	90000	329
21871	73.99	89.71	-.0965	90 38 O	71.16	920211		
	920211	105114.03	127.	-191.	1116.	9.	94117	393
	920211	153245.25	133.	-12.	229.	-2.	96020	329
	920211	170643.38	134.	-7.	157.	-5.	90000	329
	920211	183414.27	124.	-31.	362.	0.	82061	393
	920211	183429.73	121.	-53.	514.	1.	82081	393
	920211	183437.73	127.	-19.	251.	-0.	82062	393
	920211	183437.80	127.	-20.	269.	-1.	82060	393
	920211	183449.70	128.	-14.	199.	-1.	82063	393
	920211	183505.27	125.	-31.	363.	0.	82061	393
	920211	183528.97	127.	-20.	270.	2.	82060	393

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
	920211	183529.03	327.	-19.	252.	-1.	82060	393
	920211	183540.87	129.	-14.	199.	-1.	82063	393
	920211	183555.27	125.	-31.	364.	-0.	82061	393
	920211	183609.77	321.	-54.	517.	0.	82081	393
	920211	183618.97	127.	-20.	271.	-1.	82060	393
	920211	183619.03	127.	-19.	253.	-0.	82062	393
	920211	183630.87	128.	-14.	200.	-1.	82063	393
	920211	183645.27	125.	-31.	365.	-0.	82061	393
	920211	183659.87	121.	-54.	518.	0.	82081	393
	920211	183708.97	128.	-20.	272.	-1.	82060	393
	920211	183709.03	128.	-19.	254.	-0.	82062	393
	920211	183720.87	129.	-14.	201.	-1.	82063	393
	920211	183735.50	125.	-31.	366.	-0.	82061	393
	920211	183759.13	128.	-20.	273.	-1.	82060	393
	920211	183759.23	128.	-19.	255.	-1.	82062	393
	920211	183811.07	129.	-15.	202.	-1.	82063	393
21872	73.99	89.60	-.1171	93 38 R	71.15	920211		
	920211	105114.03	127.	-174.	1106.	9.	94117	393
	920211	153245.25	133.	7.	115.	-2.	90020	329
	920211	170643.38	134.	7.	19.	-5.	90000	329
	920211	183338.67	121.	-21.	343.	0.	82081	393
	920211	183414.27	124.	-6.	191.	-0.	82061	393
	920211	183429.73	121.	-21.	343.	0.	82081	393
	920211	183437.73	127.	0.	79.	-0.	82062	393
	920211	183437.80	127.	-0.	97.	-2.	82060	393
	920211	183449.70	128.	2.	26.	-1.	82063	393
	920211	183505.27	125.	-7.	191.	-0.	82061	393
	920211	183519.73	121.	-22.	343.	0.	82081	393
	920211	183528.97	127.	-1.	97.	-2.	82060	393
	920211	183529.03	127.	0.	79.	-1.	82062	393
	920211	183540.87	129.	2.	26.	-1.	82063	393
	920211	183555.27	125.	-7.	191.	-0.	82061	393
	920211	183609.77	121.	-23.	344.	-0.	82081	393
	920211	183618.97	127.	-1.	97.	-2.	82060	393
	920211	183619.03	127.	-1.	78.	-1.	82062	393
	920211	183630.87	128.	1.	25.	-1.	82063	393
	920211	183645.27	325.	-8.	193.	-0.	82063	393
	920211	183659.87	121.	-23.	344.	-0.	82081	393
	920211	183708.97	128.	-2.	96.	-2.	82060	393
	920211	133709.03	128.	-1.	78.	-1.	82062	393
	920211	183720.87	129.	0.	25.	-1.	82063	393
	920211	183735.50	125.	-9.	191.	-0.	82061	393
	920211	183759.13	128.	-2.	96.	-2.	82060	393
	920211	183759.23	128.	-2.	78.	-1.	82062	393
	920211	183811.07	129.	-0.	25.	-1.	82063	393
81005	82.35	121.06	-.0091	00 000 0	325.47	920211		
	920211	194026.24	540.	-42.	1618.	-3.	87272	396
81061	62.31	237.96	-.1899	00 000 0	84.12	920211		
	920211	065634.61	357.	-459.	1824.	3.	18955	396
	920211	065644.48	357.	-418.	1762.	-30.	18955	396
87037	99.64	112.85	-.0004	75 052 0	221.52	920212		
	920211	221310.03	796.	-179.	1751.	0.	94747	399
87117	3.90	199.68	-.0975	00 000 0	127.64	920208		
	920211	000946.59	1539.	151.	-448.	-0.	94258	399
	920211	104520.79	706.	-229.	-601.	1.	94258	399
	920211	104551.42	744.	-231.	-597.	2.	87117	399
	920211	141607.67	1634.	-250.	-528.	1.	87117	399

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
87151	65.71	107.84	-.0021	71 015 0	82.17	920211		
	920211	131309.37	252.	-214.	-1038.	-3.	94145	393
87153	98.87	99.70	-.0344	78 096 0	105.73	920209		
	920211	041108.28	402.	-6.	219.	-0.	87153	399
	920211	175600.24	404.	-9.	287.	-1.	93974	396
	920211	175615.11	404.	-9.	287.	-1.	93974	396
	920211	175625.98	404.	-9.	286.	-1.	93974	396
	920211	175635.85	404.	-9.	286.	-1.	93974	396
	920211	175645.72	404.	-9.	267.	-1.	93974	396
87207	51.15	128.47	-.0004	00 000 0	47.50	920104		
	920211	073348.76	976.	60.	-876.	-9.	89376	232
	920211	073408.84	993.	66.	-960.	7.	89376	232
	920211	073534.40	1095.	25.	-1564.	8.	89812	232
	920211	094501.10	775.	1.	-24.	14.	89832	233
87210	62.12	111.89	.0072	68 097 0	127.16	920116		
	920211	051646.07	501.	13.	769.	-13.	89810	232
87241	104.02	127.72	-.0063	76 077 0	50.30	920211		
	920211	223510.96	847.	-322.	-1797.	-2.	94750	399
87272	60.52	129.81	-.0143	00 000 0	239.98	920211		
	920120	015332.70	347.	-448.	388.	22.	87302	396
	920120	015342.56	347.	-453.	366.	-36.	87302	396
	920211	194016.37	534.	19.	-9.	20.	87272	396
	920211	194026.24	540.	19.	-10.	21.	87272	396
	920211	194036.11	547.	19.	-10.	21.	87272	396
87295	46.57	144.24	-.1454	00 000 0	57.54	920211		
	920211	110649.27	338.	-384.	1538.	-21.	94716	399
87301	26.04	189.44	-.1189	00 000 0	267.43	920202		
	920211	225812.65	1443.	190.	-683.	23.	94752	399
87302	99.15	97.00	-.0206	75 052 0	244.14	920209		
	920120	125531.79	343.	-362.	-1616.	0.	87302	396
	920120	125541.67	343.	-362.	-1616.	1.	87302	396
	920120	125551.53	343.	-362.	-1616.	0.	87302	396
	920121	021310.78	347.	-285.	-1427.	4.	87302	396
	920121	021320.64	346.	-285.	-1428.	4.	87302	396
	920121	021330.51	346.	-285.	-1427.	4.	87302	396
	920122	023430.37	346.	-171.	-1106.	4.	87302	396
	920122	023446.24	346.	-171.	-1106.	4.	87302	396
	920122	023456.12	346.	-171.	-1105.	4.	87302	396
	920122	120013.03	343.	-131.	-989.	-0.	87302	396
	920122	120022.94	343.	-131.	-989.	0.	87302	396
	920122	120032.77	343.	-131.	-989.	-0.	87302	396
	920124	123825.29	344.	-30.	-498.	-0.	87302	396
	920124	123835.16	344.	-30.	-498.	-0.	87302	396
	920124	123845.03	344.	-30.	-499.	-0.	87302	396
87306	62.22	101.20	-.0059	61 OMI 0	352.31	920207		
	920201	222215.38	303.	-350.	1268.	18.	19994	399
87308	82.61	122.05	-.0079	91 086 0	139.67	920211		
	920211	061450.98	281.	-159.	-847.	20.	87329	396
	920211	061501.05	283.	-160.	-847.	19.	87329	396
	920211	081725.53	313.	-73.	-492.	14.	87329	390
	920211	081735.39	317.	-74.	-492.	14.	87329	396
	920211	081745.26	320.	-74.	-492.	13.	87329	396

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH		
	DATE	TIME	ALT	ΔU	ΔV	ΔW	TAG	SENSOR
87309	74.39	163.74	-.0585	00 000 0	198.61	920211		
	920209	210835.47	284.	-40.	1121.	-8.	19994	399
87314	82.53	120.60	-.0082	91 086 0	138.81	920211		
	920211	130624.00	270.	2.	1.	6.	90017	329
87316	98.11	107.29	-.0012	78 026 0	358.70	920123		
	920210	223358.66	779.	-15.	-72.	12.	89407	242
	920210	223430.21	764.	-31.	-187.	20.	89407	242
87328	31.87	95.13	-.6793	91 088 0	54.42	920206		
	920211	092159.30	415.	164.	-248.	-13.	89376	232
87332	98.75	93.90	-.1123	86 019 0	295.43	920210		
	920211	125447.90	237.	-37.	516.	0.	94139	393
	920211	125625.30	238.	-36.	515.	1.	94139	393
	920211	125801.27	238.	-36.	516.	0.	94139	393
	920211	125935.77	239.	-37.	516.	1.	94139	393
	920211	130111.60	239.	-37.	515.	0.	94139	393
87333	82.95	109.87	-.1881	68 091 0	120.92	920210		
	920211	094315.63	161.	-212.	247.	6.	89376	232
	920211	094337.68	180.	-200.	199.	5.	89376	232
	920211	094359.73	204.	-183.	161.	6.	89376	232
	920211	094421.36	232.	-162.	131.	8.	89376	232
	920211	191017.87	788.	-114.	558.	1.	95222	393
87334	102.45	122.73	-.0006	76 077 0	344.32	920209		
	920211	182436.04	987.	121.	581.	-2.	93979	396
87336	100.28	106.95	-.0008	70 025 0	189.44	920129		
	920211	095954.57	589.	-7.	221.	-1.	93937	396
	920211	100004.44	588.	-7.	221.	-1.	93937	396
	920211	100014.31	588.	-6.	221.	-0.	93937	396
	920211	100024.22	588.	-7.	221.	-0.	93937	396
	920211	100034.02	588.	-6.	221.	-3.	93937	396
87338	26.46	185.47	-.2059	00 000 0	36.02	911231		
	920211	083843.59	1927.	-555.	-4430.	27.	89832	232
87345	64.78	139.40	-.0760	00 000 0	37.32	920210		
	920211	080948.96	428.	7.	-64.	-9.	90000	329
	920211	081032.68	400.	1.	-66.	-3.	90000	329
	920211	081128.50	377.	4.	-68.	-3.	90000	329
87346	69.91	107.91	-.0005	85 066 0	34.39	920212		
	920210	094148.35	603.	-90.	342.	6.	15390	398
	920211	064807.63	583.	-7.	3.	-8.	90000	329
	920211	083930.42	609.	5.	5.	-12.	90000	329
	920211	193756.79	688.	-7.	0.	6.	90000	329
	920211	212117.31	627.	-1.	-2.	7.	90000	329
	920211	212219.81	626.	-6.	-4.	-12.	90024	329
	920211	212322.30	623.	-13.	5.	0.	90000	329
87348	70.12	99.22	-.0011	69 082 0	177.89	920120		
	920211	135325.93	391.	-171.	-1335.	2.	95217	393
87351	25.90	119.75	-.2398	00 000 0	267.43	920116		
	920209	151846.06	1040.	-270.	484.	15.	88079	398
87353	28.05	107.97	-.0020	77 065 0	159.21	920111		
	920211	050842.67	671.	-174.	1672.	16.	89376	232
	920211	050905.44	625.	-169.	1532.	2.	89376	232

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
	920211	050926.67	584.	-167.	1405.	-11.	89376	232
87356	97.61	94.97	-.0374	86 019 0	145.60	920203		
	920211	130900.40	263.	-219.	1279.	3.	94144	393
	920211	130911.10	263.	-219.	1279.	3.	94144	393
	920211	130925.67	262.	-219.	1279.	4.	94144	393
	920211	130935.93	262.	-219.	1279.	4.	94144	393
87360	82.81	99.01	-.0310	81 053 0	352.34	920207		
	920211	070828.20	284.	-139.	1275.	-11.	86771	329
87365	73.48	103.36	-.0847	87 020 0	166.02	920207		
	920211	100130.79	493.	-1.	348.	-2.	93938	396
	920211	100402.07	498.	2.	343.	-3.	93938	396
87371	46.64	146.55	-.2240	00 000 0	77.26	920202		
	920211	085601.02	1307.	-88.	-721.	14.	89336	232
	920211	085640.36	1300.	-80.	-851.	-1.	89336	232
	920211	085711.05	1298.	-73.	-955.	-9.	89336	232
	920211	085815.66	1303.	-59.	-1180.	-19.	89336	232
	920211	085851.19	1312.	-52.	-1308.	-20.	89336	232
	920211	085934.81	1328.	-43.	-1470.	-17.	89336	232
	920211	090006.51	1344.	-37.	-1592.	-12.	89336	232
87372	64.71	201.69	.0151	00 000 0	1.82	920211		
	920211	090543.31	883.	17.	-10.	-0.	93721	399
87373	82.96	103.59	-.0002	81 053 0	145.06	920125		
	920211	061147.69	490.	-17.	347.	1.	93915	396
	920211	061157.56	490.	-17.	347.	1.	93915	396
	920211	061207.43	489.	-18.	347.	1.	93915	396
	920211	061217.30	489.	-18.	347.	1.	93915	396
87376	70.08	100.30	-.0007	69 082 0	167.80	920124		
	920211	182446.10	406.	-46.	591.	0.	95201	393
	920211	182608.23	406.	-46.	592.	0.	95201	393
	920211	182730.53	400.	-46.	591.	-0.	95201	393
	920211	182853.30	406.	-46.	591.	-0.	95201	393
	920211	183000.53	406.	-46.	562.	-1.	95201	393
87380	65.83	105.59	-.0001	77 121 0	77.65	920125		
	920210	094052.78	535.	-398.	-1794.	-18.	15390	398
87383	62.27	113.97	-.0007	68 093 0	69.92	920212		
	920211	113638.86	985.	-211.	902.	-19.	90447	385
	920211	113648.71	1001.	-183.	844.	20.	90447	385
	920211	113747.66	932.	-197.	-497.	-7.	94719	399
87386	62.88	127.53	-.6808	00 000 0	27.22	920210		
	920210	211939.45	1908.	20.	1362.	-0.	89298	221
87387	70.39	101.48	-.0016	69 082 0	161.43	920128		
	920231	185325.93	391.	-94.	862.	1.	95217	393
87390	100.41	105.41	-.0004	70 025 0	83.28	920130		
	920211	153334.38	506.	-82.	744.	10.	94638	399
87394	23.44	136.41	-.3651	00 000 0	166.86	920207		
	920211	094420.21	338.	7.	-958.	20.	87394	399
	920211	094511.78	301.	-5.	-964.	19.	87394	399
	920211	094657.86	234.	-30.	-975.	17.	94149	399
	920211	094754.22	202.	-44.	-980.	15.	94149	399
	920211	143508.67	151.	-257.	-1039.	-7.	94149	399

SAT	INC / DATE	PERIOD / TIME	DRAG / ALT	INTL DESIG / ΔU	R.A. / ΔV	EPOCH / ΔW	TAG	SENSOR
87395	62.79	91.24	-.0893	92 003 0	45.90	920205		
	920209	095244.27	186.	-257.	-1462.	3.	88079	398
87398	23.04	142.23	-.0583	00 000 0	358.13	920207		
	920211	050842.67	214.	61.	-45.	-5.	89376	232
	920211	050905.44	267.	120.	-96.	24.	89376	232
87403	84.11	140.97	-.2335	00 000 0	237.06	920206		
	920211	121038.61	1266.	61.	-101.	-17.	83999	222
87455	63.45	176.21	-.0184	87 036 0	52.34	920212		
	920211	053635.68	2045.	-82.	171.	-3.	89812	232
	920211	053724.35	2144.	-38.	81.	-3.	89812	232
	920211	053749.34	2196.	-16.	34.	-3.	89812	232
	920211	053816.92	2252.	9.	-18.	-3.	89812	232
	920211	053905.00	2352.	51.	-111.	-3.	89812	232
	920211	053934.41	2413.	77.	-168.	-3.	89812	232
	920211	054001.99	2470.	101.	-223.	-3.	89812	232
	920211	054029.14	2526.	124.	-277.	-3.	89812	232
87568	27.25	104.08	-.1546	77 065 0	103.30	920204		
	920211	051807.34	835.	164.	-169.	15.	94699	399
87660	73.95	118.13	0.0000	91 009 0	92.00	920211		
	920211	084538.84	921.	-192.	1405.	-14.	89335	232
87711	61.97	200.83	-.0078	78 020 0	90.44	920211		
	920211	092047.21	5333.	121.	-6336.	1.	89376	232
	920211	092111.34	5330.	89.	-6401.	-1.	89376	232
	620211	092134.88	5327.	56.	-6463.	-3.	89376	232
	920211	092159.30	5324.	20.	-6529.	-5.	39376	232
87715	63.30	99.59	-.2496	00 000 0	190.19	920210		
	920211	003102.63	453.	-2.	-6.	0.	90000	329
87855	84.25	144.63	-.0946	00 000 0	335.86	920211		
	920211	051730.95	821.	489.	-731.	-14.	94699	399
87869	65.00	96.26	-.0468	83 044 0	35.91	920206		
	920211	012726.24	275.	-6.	-238.	1.	93888	396
	920211	012736.11	276.	-5.	-238.	1.	93888	396
	920211	012745.98	276.	-5.	-238.	1.	93888	396
	920211	012755.85	276.	-6.	-238.	1.	93888	396
	920211	012805.72	277.	-6.	-239.	1.	93888	396
	920211	220531.05	268.	-3.	-245.	2.	94745	399
	920211	220558.32	268.	-3.	-245.	2.	94745	399
	920211	220604.61	268.	-3.	-245.	2.	94745	399
	920211	220612.01	208.	-3.	-245.	2.	94745	399
	920211	220618.41	268.	-3.	-245.	2.	94745	399
	920211	220624.64	268.	-3.	-245.	2.	94745	399
	920211	220632.12	268.	-3.	-245.	2.	94745	399
	920211	220639.87	268.	-3.	-245.	2.	94745	399
	920211	220646.18	208.	-3.	-245.	2.	94745	399
	920211	220652.89	268.	-3.	-246.	2.	94745	399
	920211	220700.56	268.	-3.	-246.	2.	94745	399
87947	62.24	112.94	-.0030	68 097 0	299.03	920211		
	920210	045915.51	622.	-335.	-120.	5.	15390	398
	920211	195236.22	756.	-417.	2419.	5.	19111	396
87980	99.68	105.37	-.0000	75 052 0	265.16	920210		
	920208	132444.34	598.	-21.	-476.	-15.	88079	398

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH		
	DATE	TIME	ALT	ΔU	ΔV	ΔW	TAG	SENSOR
88010	69.40	727.21	.0032	00 000 0	97.10	911212		
	920211	141657.85	16919.	-503.	-2884.	29.	89505	221
	920211	141742.97	16858.	-501.	-2902.	-26.	89505	221
88025	26.88	523.34	-.0024	67 001 0	107.20	920125		
	920122	075031.28	786.	-562.	-2441.	40.	88066	398
88028	17.02	300.80	.0017	00 000 0	354.12	920311		
	920205	025953.06	770.	-430.	321.	-25.	15390	398
	920211	090056.60	4638.	648.	3878.	-36.	89832	232
	920211	090126.29	4562.	663.	3781.	-23.	89832	232
	920211	090146.96	4508.	674.	3713.	-14.	89832	232
	920211	090212.96	4441.	686.	3528.	-2.	89832	232
88032	3.46	697.43	-.0008	00 000 0	211.01	911231		
	920131	233733.43	1217.	-144.	345.	-6.	88032	398
	920131	233827.41	1125.	-139.	352.	-5.	88032	398
	920131	233859.01	1074.	-135.	355.	-4.	88032	398
	920131	233930.20	1024.	-132.	358.	-3.	88032	398
	920131	234001.14	976.	-130.	362.	-3.	88032	398
	920131	234032.22	930.	-126.	365.	-1.	88032	398
	920131	234103.31	886.	-122.	369.	0.	88032	398
	920131	234134.18	841.	-120.	371.	-1.	88032	398
	920131	234207.02	799.	-115.	375.	1.	88032	398
	920131	234240.62	756.	-111.	379.	2.	88032	398
	920131	234314.37	717.	-105.	382.	3.	88032	398
	920131	234351.53	677.	-100.	386.	4.	88032	398
88033	27.54	494.50	-.0245	67 001 0	306.68	920207		
	920211	103545.78	13139.	-158.	-1256.	-39.	89832	231
	920211	103614.94	13161.	-157.	-1258.	-31.	89832	231
	920211	103641.84	13181.	-155.	-1256.	-22.	89832	231
	920211	103708.06	13201.	-154.	-1255.	-14.	89832	231
	920211	103754.13	13235.	-152.	-1256.	-1.	89832	231
	920211	103822.07	13256.	-150.	-3253.	9.	89832	231
	920211	103934.11	13309.	-147.	-1252.	31.	89832	231
	920211	103954.72	13325.	-145.	-1250.	38.	89832	231
	920211	173019.24	8808.	-792.	6117.	-40.	90000	241
	920211	173159.75	6933.	-752.	6027.	-12.	90001	241
	920211	173236.93	8680.	-748.	6014.	7.	90001	241
	920211	173319.96	9033.	-743.	5998.	31.	90001	241
	920211	173345.84	9065.	-740.	5988.	45.	90001	241
	920211	173350.45	9072.	-716.	5944.	10.	90002	242
	920211	173433.40	9125.	-712.	5930.	34.	90002	242
88034	03.55	691.66	-.0134	76 006 0	247.55	920201		
	920211	025459.73	1129.	-131.	1869.	14.	90198	383
88035	67.66	726.42	.0030	79 058 0	99.15	911211		
	920211	075122.26	10880.	166.	-5464.	18.	89376	232
	920211	075144.00	10834.	104.	-8482.	16.	89376	232
	920211	075205.23	10809.	163.	-5500.	13.	89376	232
	920211	075228.91	10781.	161.	-5519.	11.	89376	232
88045	8.12	802.89	-.0030	84 081 0	358.32	920211		
	920201	003122.15	590.	-740.	-2492.	46.	88788	398
88048	23.17	623.13	-.0070	00 000 0	340.65	920120		
	920127	004924.94	277.	9.	-195.	14.	88048	398
	920127	004952.17	261.	7.	-196.	13.	88048	398
	920127	005004.26	255.	6.	-196.	12.	88048	398
	920127	005015.94	249.	5.	-196.	11.	88048	398
	920127	005028.42	244.	4.	-196.	10.	88048	398

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
	920127	005041.25	239.	3.	-196.	9.	88048	398
	920127	005053.62	235.	2.	-196.	9.	88048	398
	920127	005108.01	230.	1.	-196.	6.	88048	398
	920127	005122.98	226.	-0.	-196.	7.	88048	398
	920127	005140.99	223.	-1.	-197.	5.	88048	398
	920130	013501.19	220.	-27.	-361.	-3.	88048	398
	920130	013529.74	224.	-33.	-360.	-3.	88048	398
	920130	013539.88	226.	-34.	-360.	-4.	88048	398
	920130	013549.80	228.	-36.	-359.	-4.	88048	398
	920130	013600.29	231.	-38.	-359.	-5.	88048	398
	920130	013613.72	236.	-40.	-359.	-6.	88048	398
88056	26.92	553.05	.0020	00 000 0	83.79	920107		
	920124	052920.50	515.	-693.	-1868.	-24.	12102	385
88057	26.69	271.39	-.0304	00 000 0	215.04	920210		
	920206	150321.55	1264.	-610.	1536.	-10.	68079	398
88061	20.52	714.41	-.0003	00 000 0	341.52	920105		
	920211	041108.28	402.	-1179.	-70.	-37.	87153	399
88065	10.28	265.95	-.0179	00 000 0	104.93	920111		
	920211	112934.68	846.	143.	1807.	-15.	94718	399
88066	26.92	433.66	-.0201	88 012 0	5.12	920121		
	920122	075031.28	786.	6.	-13.	-11.	68066	398
88067	26.03	523.75	-.0066	67 001 0	313.39	920108		
	920211	173345.84	2383.	380.	-3670.	-09.	90001	241
	920211	173350.45	2404.	361.	-3717.	-45.	90002	242
	920211	173433.40	2591.	252.	-4059.	-10.	90002	242
	920211	173502.61	2717.	167.	-4289.	14.	90002	242
	920211	173530.30	2836.	77.	-4505.	37.	90002	242
88072	23.93	291.27	-.1030	67 001 0	135.22	920116		
	920202	124621.80	281.	50.	-524.	2.	88072	398
	920202	124649.58	257.	42.	-527.	3.	88072	398
	920202	124701.60	247.	39.	-529.	3.	88072	398
	920202	124713.34	237.	36.	-530.	3.	88072	398
	920202	124725.05	229.	33.	-531.	3.	88072	398
	920202	124736.96	220.	29.	-532.	3.	88072	398
	920202	124748.97	211.	26.	-533.	4.	88072	398
	920202	124801.19	203.	22.	-534.	4.	88072	398
	920202	124813.18	195.	19.	-535.	4.	88072	398
	920202	124825.76	187.	15.	-536.	4.	88072	398
	920202	124839.21	179.	11.	-536.	4.	88072	398
	920202	124852.63	171.	7.	-537.	4.	88072	398
	920211	173652.59	5754.	-60.	-2472.	27.	90003	241
	920211	173725.84	5722.	-61.	-2513.	16.	90003	241
	920211	173743.47	5705.	-62.	-2535.	10.	89417	242
	920211	173801.52	5687.	-63.	-2558.	4.	90003	241
	920211	173812.63	5677.	-63.	-2572.	0.	89417	242
	920211	173841.65	5648.	-65.	-2608.	-9.	89417	242
	920211	173911.53	5620.	-66.	-2646.	-19.	89417	242
88074	60.65	714.08	-.0023	00 000 0	120.94	920116		
	920211	175401.07	21374.	-121.	-3929.	22.	89416	242
88075	20.70	506.33	-.0217	67 001 0	348.77	920108		
	920210	235311.23	607.	72.	750.	1.	88075	399
	920210	235357.48	667.	89.	743.	3.	88075	399
	920210	235456.53	751.	110.	734.	1.	88075	399
	920210	235556.63	942.	130.	724.	0.	88075	399

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH		
	DATE	TIME	ALT	ΔU	ΔV	ΔW	TAG	SENSOR
	920210	235657.12	939.	149.	712.	0.	88075	399
	920211	085933.98	4628.	973.	2575.	45.	90000	951
	920211	085949.03	4658.	-969.	2670.	47.	90000	951
	920211	090003.68	4687.	-965.	2665.	50.	90000	951
	920210	235354.29	156.	-502.	1031.	-31.	94677	399
	920210	235400.74	157.	-509.	1035.	-24.	94677	399
	920210	235407.22	158.	-515.	1038.	-16.	94677	399
	920210	235413.49	159.	-522.	1042.	-8.	94677	399
	920210	235419.75	161.	-528.	1046.	-1.	94677	399
	920210	235426.21	162.	-535.	1051.	7.	94677	399
	920210	235432.50	164.	-542.	1055.	14.	94677	399
	920210	235439.16	166.	-549.	1059.	22.	94677	399
	920210	235445.69	167.	-556.	1064.	30.	94677	399
	920210	235452.46	169.	-563.	1068.	38.	94677	399
88076	8.53	562.62	-.0053	00 000 0	190.75	920118		
	920119	172158.36	2079.	1123.	2573.	44.	11718	398
	920211	085725.14	1272.	175.	-441.	11.	94711	398
	920211	085821.51	1168.	167.	-451.	10.	94711	399
	920211	085836.99	1141.	165.	-455.	10.	94711	399
	920211	085854.15	1111.	162.	-457.	10.	94711	399
	920211	085915.18	1074.	159.	-461.	9.	94711	399
88079	27.00	309.94	-.0067	00 000 0	185.20	920112		
	920204	110819.68	178.	-177.	-924.	3.	88079	398
	920204	110844.96	179.	-188.	-921.	2.	88079	398
	920204	110903.01	182.	-195.	-618.	2.	88079	398
	920204	110920.81	185.	-202.	-915.	2.	88079	398
	920204	110938.64	169.	-209.	-912.	2.	88079	398
	920204	110956.35	195.	-215.	-908.	2.	88079	398
	920204	111014.06	200.	-223.	-905.	2.	88079	398
	920204	111031.90	207.	-233.	-901.	2.	88079	398
	920204	111049.97	214.	-236.	-898.	2.	88079	398
	920204	111107.90	223.	-243.	-894.	2.	88079	398
	920204	111126.11	232.	-249.	-890.	2.	88079	398
	920204	111144.84	242.	-255.	-885.	2.	88079	398
	920205	130417.49	403.	-349.	-903.	1.	88079	398
	920205	130509.50	459.	-361.	-887.	0.	88079	398
	920205	130558.03	515.	-370.	-872.	0.	88079	398
	920205	130650.07	580.	-379.	-856.	-0.	88079	398
	920205	130741.94	649.	-386.	-840.	-1.	88079	398
	920205	183534.10	2533.	-401.	-594.	-5.	88079	398
	920206	145927.72	876.	-444.	-856.	-1.	88079	398
	920206	150018.37	956.	-447.	-340.	-2.	88079	398
	920206	150119.14	1055.	-450.	-822.	-2.	88079	398
	920206	150219.99	1158.	-452.	-804.	-2.	88079	398
	920206	150321.55	1264.	-453.	-786.	-2.	88079	398
	920207	112808.80	203.	-335.	-1126.	2.	88079	398
	920207	113001.43	261.	-379.	-1092.	1.	88079	398
	920207	165639.68	1709.	-492.	-776.	-3.	88079	398
	920208	132305.70	476.	-493.	-1085.	-0.	88079	398
	920208	132444.34	598.	-510.	-1047.	-0.	88079	398
	920208	132630.42	746.	-522.	-1007.	-1.	88079	398
	920209	095244.27	186.	-293.	-1340.	3.	88079	398
	920209	095357.29	175.	-339.	-1324.	2.	88079	398
	920209	151846.06	1040.	-583.	-1004.	-3.	88079	398
	920210	114604.06	211.	-485.	-1354.	1.	88079	398
	920210	114827.40	299.	-541.	-1297.	1.	88079	398
	920211	080906.00	834.	323.	-296.	-2.	94236	399
	920211	134139.59	557.	-655.	-1263.	-1.	88079	398
	920211	134324.21	697.	-667.	-1215.	-2.	88079	398
	920211	134515.73	863.	-674.	-1167.	-3.	88079	398
	920211	134139.59	557.	-655.	-1263.	-1.	88079	399

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH		
	DATE	TIME	ALT	ΔU	ΔV	ΔW	TAG	SENSOR
	920211	134324.21	697.	-667.	-1215.	-2.	88079	399
	920211	134515.73	863.	-674.	-1167.	-3.	88079	399
	920211	131840.00	791.	-576.	2550.	8.	90233	383
	920211	131850.04	809.	-543.	2552.	-18.	90233	383
88082	68.91	713.17	0.0000	76 105 0	300.97	920105		
	920211	094537.73	2225.	392.	-3505.	14.	89832	233
	920211	094615.92	2357.	316.	-3801.	-32.	89832	233
88083	25.60	711.74	-.0251	00 000 0	336.16	920104		
	920210	235311.41	607.	109.	938.	-1.	88075	399
	920210	235357.48	667.	158.	916.	15.	88075	399
	920210	235456.53	751.	219.	883.	34.	88075	399
	920211	120844.16	3058.	143.	-408.	39.	83999	222
	920211	121000.75	3276.	178.	-569.	2.	83999	222
	920211	121038.61	3384.	194.	-649.	-17.	83999	222
	920210	235329.99	353.	-439.	1178.	-31.	94677	399
	920210	235354.29	156.	-447.	1180.	6.	94677	399
	920210	235400.74	157.	-449.	1181.	16.	94877	399
	920210	235407.22	158.	-451.	1181.	26.	94677	399
	920210	235413.49	159.	-453.	1182.	36.	94677	399
	920210	235419.75	161.	-455.	1183.	45.	94677	399
88086	18.04	384.11	-.5044	00 000 0	109.72	920201		
	920211	035908.09	700.	-558.	1334.	42.	90201	382
	920211	035918.13	685.	-556.	1334.	30.	90201	382
	920211	035948.37	644.	-543.	1335.	-3.	90201	382
88102	26.95	409.64	-.0226	86 016 0	35.99	920112		
	920113	055509.31	706.	-32.	661.	-37.	12102	399
88108	7.02	1422.17	0.0000	00 000 0	64.88	920210		
	920210	211716.37	19162.	4.	29.	8.	89298	221
	920210	211804.49	19162.	4.	30.	8.	89298	221
	920210	211850.51	19162.	4.	32.	8.	89298	221
	920210	211939.45	19163.	5.	39.	8.	89298	221
	920211	185826.02	19171.	-0.	44.	9.	89298	243
	920211	185858.68	19171.	-0.	44.	9.	89298	243
	920211	185926.40	19171.	-0.	44.	9.	89298	243
	920211	185956.86	19171.	-0.	44.	9.	89298	243
	920210	224108.97	19163.	-68.	1884.	14.	89412	242
	920210	224146.21	19163.	-67.	1883.	7.	89412	242
	920210	224225.01	19163.	-67.	1882.	-0.	89412	242
	920210	224301.19	19163.	-67.	1881.	-7.	89412	242
	920210	232656.94	19159.	-33.	1384.	44.	89413	242
	920210	232721.32	19159.	-33.	1383.	42.	89413	242
	920210	232742.25	19359.	-33.	1383.	41.	89413	242
	920210	232803.48	19159.	-33.	1382.	40.	89413	242
88111	7.96	1435.11	0.0000	00 000 0	58.15	920209		
	920210	224108.97	19406.	-357.	4411.	-13.	89412	242
	920210	224146.21	19407.	-356.	4411.	-19.	89412	242
	920210	224225.01	19407.	-356.	4410.	-25.	89412	242
	920210	224301.19	19407.	-356.	4410.	-30.	89412	242
	920211	172857.63	19296.	-275.	3832.	-14.	90000	241
	920211	172923.67	19297.	-275.	3832.	-14.	90000	241
	920211	172952.42	19297.	-275.	3832.	-14.	90000	241
	920211	173019.24	19297.	-275.	3832.	-14.	90000	241
	920211	173159.75	19296.	-253.	3694.	17.	90001	241
	920211	173236.93	19296.	-252.	3691.	17.	90001	241
	920211	173319.96	19296.	-251.	3637.	13.	90001	241
	920211	173345.84	19296.	-251.	3685.	19.	90001	241
	920211	173350.45	19297.	-230.	3558.	4.	90002	242

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH		
	DATE	TIME	ALT	ΔU	ΔV	ΔW	TAG	SENSOR
	920211	173433.40	19297.	-230.	3558.	5.	90002	242
	920211	173502.61	19297.	-230.	3557.	6.	90002	242
	920211	173530.30	19297.	-230.	3557.	6.	90002	242
	920211	173616.76	19297.	-230.	3556.	7.	90003	241
	920211	173652.59	19297.	-230.	3556.	7.	90003	241
	920211	173725.84	19297.	-230.	3556.	8.	90003	241
	920211	173743.47	19297.	-230.	3556.	6.	89417	242
	920211	173801.52	19297.	-230.	3555.	8.	90003	241
	920211	173812.63	19297.	-233.	3556.	8.	89417	242
	920211	173841.65	19297.	-230.	3555.	9.	89417	242
	920211	173911.53	19298.	-230.	3555.	10.	89417	242
	920211	174036.02	19298.	-229.	3554.	31.	89417	242
	920211	174100.85	19298.	-229.	3554.	11.	89417	242
	920211	174117.68	19299.	-275.	3834.	-9.	89415	241
	920211	174127.77	19298.	-229.	3554.	12.	89417	242
	920211	174144.50	19299.	-275.	3834.	-9.	89415	241
	920211	174154.62	19298.	-229.	3553.	12.	89417	242
	920211	174209.95	19299.	-275.	3834.	-9.	89415	241
	920211	174235.53	19299.	-275.	3834.	-9.	89415	241
	920211	174250.79	19298.	-229.	3553.	13.	89417	242
	920211	174354.95	19299.	-275.	3834.	-3.	89415	241
	920211	174407.61	19296.	-229.	3552.	14.	89417	242
	920211	174419.76	19299.	-275.	3834.	-8.	89415	241
	920211	174433.94	19298.	-229.	3552.	15.	89417	242
	920211	174443.66	19299.	-275.	3834.	-8.	89415	241
	920211	174459.73	19299.	-229.	3552.	15.	89417	242
	920211	174508.59	19299.	-275.	3835.	-8.	89415	241
	920211	174525.20	19299.	-229.	3551.	16.	89417	242
	920211	174633.88	19300.	-275.	3835.	-7.	89415	241
	920211	174634.25	19299.	-229.	3551.	17.	89417	242
	920211	174701.55	19300.	-275.	3835.	-7.	89415	241
	920211	174711.38	19299.	-229.	3550.	17.	89417	242
	920211	174726.68	19300.	-275.	3835.	-7.	89415	241
	920211	174736.50	19299.	-229.	3550.	18.	89417	242
	920211	174751.79	19300.	-275.	3835.	-7.	89415	241
	920211	174808.02	19299.	-229.	3550.	18.	89417	242
	920211	174913.11	19300.	-275.	3835.	-6.	89415	241
	920211	174940.71	19300.	-275.	3835.	-6.	89415	241
	920211	175001.63	19299.	-238.	3602.	41.	89416	242
	920211	175006.70	19300.	-275.	3835.	-5.	89415	241
	920211	175039.33	39301.	-275.	3835.	-5.	89415	241
	920211	175040.69	19299.	-238.	3599.	42.	89416	242
	920211	175147.94	19299.	-237.	3594.	43.	89416	242
	920211	175257.00	19299.	-236.	3588.	44.	89416	242
	920211	175401.07	19299.	-235.	3582.	46.	89416	242
	920211	175544.14	19299.	-234.	3574.	48.	89416	242
	920211	175610.24	19300.	-233.	3571.	49.	89416	242
	920211	175641.24	19300.	-233.	3569.	49.	89416	242
	920211	175726.50	19301.	-228.	3544.	27.	90004	241
	920211	175758.10	19301.	-228.	3544.	27.	90004	241
	920211	175828.40	19301.	-226.	3544.	28.	90004	241
	920211	175859.75	19301.	-228.	3544.	28.	90004	241
88112	18.38	1407.40	0.0000	00 000 0	62.54	920209		
	920211	141612.28	18976.	1.	0.	14.	89505	221
	920211	141657.85	18967.	1.	-0.	14.	89505	221
	920211	141742.97	18957.	1.	0.	13.	89505	221
	920211	141832.10	18947.	1.	1.	13.	89505	221
88114	11.34	1435.37	0.0000	00 000 0	47.28	920210		
	920211	144608.40	19362.	0.	-21.	10.	89785	221
	920211	144657.50	19362.	0.	-21.	10.	89785	221
	920211	144717.19	19362.	0.	-21.	10.	89785	221

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
	920211	144736.67	19362.	0.	-21.	10.	89785	221
88117	16.25	1695.54	0.0000	00 000 0	37.21	920210		
	920211	064649.66	21609.	0.	-5.	18.	89871	231
	920211	064813.17	21608.	0.	-4.	17.	89871	231
	920211	064928.93	23608.	0.	-5.	18.	89871	231
	920211	064956.54	21607.	0.	-5.	18.	89871	231
	920211	075734.75	21575.	0.	-5.	13.	89871	231
	920211	075840.02	21574.	0.	-4.	13.	89871	231
	920211	075859.00	21574.	0.	-5.	13.	89871	231
	920211	075921.67	21574.	0.	-5.	13.	89871	231
88119	65.32	335.21	-.0750	85 118 0	22.90	920206		
	920211	130618.89	3786.	322.	-399.	-29.	80108	334
	920211	130702.79	3712.	325.	-408.	-31.	80108	334
	920211	130724.53	3674.	326.	-409.	-30.	80108	334
	920211	130746.10	3638.	328.	-414.	-33.	80108	334
	920211	130807.52	3599.	327.	-415.	-29.	80108	334
	920211	130828.77	3563.	329.	-421.	-30.	80108	334
	920211	130849.87	3527.	330.	-423.	-30.	80108	334
	920211	130910.81	3490.	330.	-426.	-29.	80108	334
	920211	130931.59	3452.	330.	-432.	-27.	80108	334
	920211	130952.22	3420.	334.	-436.	-34.	80108	334
	920211	131002.48	3400.	333.	-440.	-30.	80108	334
	920211	131022.89	3363.	332.	-444.	-27.	80108	334
	920211	131043.15	3329.	335.	-447.	-30.	80108	334
	920211	131103.26	3294.	336.	-450.	-31.	80108	334
	920211	131123.23	3258.	335.	-454.	-29.	80108	334
	920211	131150.48	3211.	338.	-458.	-31.	80108	334
	920211	131209.80	3176.	338.	-462.	-30.	80108	334
	920211	131228.98	3144.	340.	-466.	-32.	80108	334
	920211	131248.03	3110.	340.	-474.	-32.	80108	334
	920211	131313.23	3063.	340.	-476.	-29.	80108	334
	920211	131331.98	3030.	341.	-481.	-30.	80108	334
	920211	131402.95	2974.	340.	-489.	-28.	80108	334
	920211	131421.37	2941.	341.	-492.	-28.	80108	334
	920211	131439.67	2908.	341.	-491.	-28.	80108	334
	920211	131457.86	2877.	342.	-499.	-29.	80108	334
	920211	131515.93	2845.	344.	-501.	-30.	80108	334
	920211	131539.84	2802.	343.	-507.	-29.	80108	334
	920211	131922.29	2401.	343.	-560.	-27.	80108	334
	920211	131942.00	2367.	343.	-566.	-28.	80108	334
	920211	132001.59	2331.	342.	-572.	-26.	80108	334
88120	7.47	421.27	-.0465	00 000 0	148.79	920120		
	920207	071228.77	7617.	-914.	1359.	46.	21538	334
	920207	071300.91	7676.	-813.	1365.	8.	21538	334
	920207	071311.24	7696.	-781.	1370.	-6.	21538	334
	920207	071321.07	7713.	-749.	13631	-13.	21538	334
	920207	071330.93	7730.	-719.	1359.	-28.	21538	334
	920207	071340.81	7748.	-689.	1363.	-46.	21538	334
	920211	173319.96	1279.	544.	-1468.	-42.	90001	241
	920211	173345.84	1360.	606.	-1631.	-26.	90001	241
	920211	173350.45	1375.	614.	-1670.	-24.	90002	242
	920211	173433.40	1522.	-707.	-1959.	5.	90002	242
	920211	173502.61	1627.	760.	-2167.	25.	90002	242
	920211	173530.30	1731.	803.	-2371.	45.	90002	242
	920211	104534.61	525.	59.	1190.	1.	94257	399
	920211	104627.89	599.	94.	1177.	1.	94257	399
	920211	104727.00	687.	132.	1161.	1.	94257	399
	920211	104827.12	782.	166.	1142.	1.	94257	399
	920211	104927.81	883.	200.	1121.	1.	94257	399
	920211	105034.13	998.	232.	1098.	0.	94257	399

SAT	INC	PERIOD	DRAG	INTL DESIG	R.A.	EPOCH		
	DATE	TIME	ALT	ΔU	ΔV	ΔW	TAG	SENSOR
88127	27.73	547.10	-.0023	00 000 0	8.50	920210		
	920121	012425.76	1479.	-143.	-951.	-35.	88893	398
88446	7.15	466.94	-.0515	88 063 0	190.50	911231		
	920211	135416.12	671.	99.	1402.	1.	94637	399
	920211	135503.63	747.	136.	1386.	0.	94637	399
	920211	135603.62	849.	181.	1363.	0.	94637	399
	920211	135702.68	954.	222.	1340.	0.	94637	399
	920211	135803.88	1067.	262.	1314.	1.	94637	399
88454	67.60	735.51	0.0000	00 000 0	75.35	920201		
	920211	043121.74	17896.	-532.	-6116.	29.	2865	369
88540	16.82	702.36	-.0622	00 000 0	332.05	920212		
	920211	011248.91	385.	-1343.	1073.	-47.	94679	399
88629	18.55	698.71	-.0045	00 000 0	189.66	920205		
	920211	123620.44	3330.	-70.	-77.	12.	88629	334
	920211	123643.86	3381.	-71.	-77.	8.	88629	334
	920211	123751.07	3531.	-71.	-75.	8.	88629	334
	920211	123849.23	3662.	-69.	-75.	12.	88629	334
	920211	124021.77	3966.	-69.	-78.	9.	88629	334
88632	52.27	324.35	-.0666	83 127 0	291.29	920231		
	920211	084039.55	1525.	635.	1343.	-11.	89832	232
	920211	084103.66	1479.	591.	1223.	20.	89832	232
88699	17.29	573.93	-.0499	90 065 0	163.40	920211		
	920211	081020.79	1849.	-156.	-1156.	43.	90216	382
88732	62.60	277.33	-.0440	87 036 0	283.69	920201		
	920211	003625.05	644.	55.	1546.	36.	90000	329
88737	7.19	458.64	-.0391	88 063 0	132.19	911230		
	920211	173530.30	3861.	-853.	6751.	32.	90002	242
	920211	173616.76	3681.	-514.	6396.	5.	90003	241
	920211	173652.59	3544.	-284.	6117.	-16.	90003	241
	920211	173725.84	3418.	-94.	5845.	-35.	90003	241
	920211	173743.47	3351.	-2.	5701.	-45.	89417	242
88764	27.03	688.10	-.0040	00 000 0	293.97	920206		
	920208	211808.34	299.	-402.	-439.	-16.	19994	399
88769	17.59	616.92	-.0192	90 065 0	178.87	920201		
	920211	124356.87	2664.	236.	313.	0.	88769	334
	920211	124605.37	2962.	241.	287.	6.	88769	334
	920211	125025.62	3556.	240.	254.	5.	88769	334
	920211	125124.41	3688.	238.	251.	8.	88769	334
	920211	125157.84	3761.	235.	246.	-3.	88769	334
88788	8.58	582.76	-.0195	85 056 0	4.99	920116		
	920129	235105.84	1441.	-24.	55.	-3.	88788	398
	920129	235203.40	1325.	-24.	55.	-3.	88788	398
	920129	235245.77	1242.	-23.	56.	-3.	88788	398
	920129	235327.88	1162.	-22.	55.	-2.	88788	398
	920129	235410.28	1081.	-22.	57.	-2.	88788	398
	920129	235511.74	970.	-21.	59.	-2.	88788	398
	920129	235554.67	894.	-20.	60.	-2.	88788	398
	920129	235638.11	822.	-19.	60.	-2.	88788	398
	920129	235722.03	751.	-10.	61.	-1.	88788	398
	920129	235803.60	683.	-22.	72.	-6.	88788	398
	920131	052028.33	445.	17.	90.	2.	88788	398
	920201	003122.15	590.	-31.	112.	-1.	88788	398

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
	920211	223247.69	623.	-203.	-582.	29.	90462	385
	920211	031726.25	1128.	785.	915.	-26.	94567	399
	920211	223258.96	635.	-173.	-584.	17.	94750	399
	920211	223337.13	693.	-56.	-589.	-7.	94750	399
	920211	223404.43	735.	26.	-599.	-25.	94750	399
	920211	223435.15	788.	120.	-618.	-44.	94750	399
88794	88.98	166.31	-.0006	66 077 0	269.78	920211		
	920211	064813.17	2771.	-4.	65.	-23.	89871	231
	920211	064928.93	2800.	13.	-356.	9.	89871	231
	920211	064956.54	2812.	19.	-237.	21.	89871	231
88812	26.59	398.66	-.0376	67 001 0	121.82	911214		
	920211	135503.63	747.	-140.	-398.	-30.	94637	399
88838	63.12	287.49	-.0004	00 000 0	135.04	911229		
	920211	092047.21	239.	-265.	468.	1.	89376	232
	920211	092111.34	246.	-256.	374.	-2.	89376	232
	920211	092134.88	204.	-244.	301.	-2.	89376	232
	920211	092159.30	294.	-222.	241.	-1.	89376	232
88847	58.75	734.40	-.0005	00 000 0	160.40	920130		
	920211	080706.10	1057.	3.	-1685.	44.	94236	399
	920211	081010.75	1831.	-123.	-3560.	-32.	90216	382
88848	19.97	485.54	-.0097	00 000 0	335.81	911228		
	920209	024650.96	1012.	-437.	200.	11.	15390	398
	920211	031524.51	899.	-968.	1177.	36.	94567	399
	920211	031625.58	1011.	-756.	1276.	-2.	94567	399
	920211	031726.20	1128.	-539.	1356.	-40.	94567	399
88850	5.98	661.51	-.0015	00 000 0	77.90	920131		
	920211	025439.64	1096.	3.	54.	-7.	90198	383
	920211	025459.73	1129.	5.	56.	-7.	90198	383
	920211	025509.77	1146.	5.	55.	-7.	90198	383
	920211	025529.86	1180.	6.	56.	-6.	90198	383
	920211	025539.90	1197.	6.	57.	-7.	90198	383
88856	62.94	158.08	-.0147	00 000 0	227.35	920211		
	920211	000143.45	2177.	-1.	-5.	-10.	88856	399
	920211	000421.52	2037.	0.	-8.	-3.	88856	399
	920211	133615.76	794.	-406.	55.	13.	94719	399
88868	7.34	604.00	-.0002	84 081 0	326.40	920112		
	920211	175709.66	3387.	-189.	-5522.	-33.	89416	242
	920211	175728.50	3469.	-286.	-5671.	-24.	90004	241
	920211	175758.10	3595.	-440.	-5897.	-4.	90004	241
	920211	175820.40	3723.	-807.	-6124.	17.	90004	241
	920211	175847.64	3804.	-715.	-6253.	36.	89416	242
	920211	175859.75	3855.	-787.	-6353.	39.	90004	241
	920211	072951.39	1288.	-1097.	3055.	40.	90233	388
88871	27.19	281.68	-.0030	00 000 0	203.83	911230		
	920211	165814.93	2625.	40.	1441.	-21.	8547	334
	920211	165853.48	2550.	-95.	1410.	21.	8547	334
88879	63.21	718.07	.0039	90 101 0	4.74	911217		
	920211	100911.49	3611.	229.	-5243.	-30.	89813	232
	920211	100943.36	3658.	155.	-5421.	-3.	89813	232
88884	24.76	617.94	-.1068	84 093 0	76.57	920128		
	920206	143035.10	2210.	-1157.	4985.	-19.	15390	398
	920206	143201.50	2359.	-879.	4930.	-29.	15390	398

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
	920206	143330.85	2511.	-633.	4857.	-43.	15390	398
	920204	110819.68	178.	-464.	-125.	23.	88079	398
88888	5.92	663.22	-.0026	00 000 0	129.28	911210		
	920210	224923.21	18734.	-1231.	8192.	-13.	89416	242
	920210	224954.97	18751.	-1239.	8217.	-17.	89416	242
	920210	225040.46	18775.	-1249.	8254.	-24.	89416	242
	920210	225117.77	18795.	-1257.	6284.	-30.	89416	242
	920210	225302.73	18849.	-1281.	8368.	-46.	89417	242
88892	26.56	494.39	-.0052	67 001 0	245.98	920109		
	920126	220010.21	1245.	-186.	347.	0.	88892	398
	920126	220133.89	1093.	-181.	360.	1.	88892	398
	920126	220347.36	869.	-169.	381.	2.	88892	398
	920128	232902.17	604.	-180.	408.	2.	88892	398
	920128	233002.62	808.	-181.	416.	2.	88892	398
	920128	233141.60	664.	-169.	436.	3.	88892	398
	920206	213722.87	995.	-417.	773.	0.	88892	398
	920206	213800.26	632.	-413.	785.	0.	88892	398
88893	26.85	254.19	-.0472	00 000 0	268.52	920118		
	920119	025118.25	1248.	18.	-37.	1.	88893	398
	920119	025330.32	1035.	16.	-40.	1.	88893	398
	920119	025559.54	808.	12.	-43.	1.	88893	398
	920121	012227.11	1680.	57.	-106.	-1.	88893	398
	920121	012316.83	1595.	56.	-109.	1.	88893	398
	920121	012425.76	1479.	55.	-113.	1.	88893	398
	920123	042117.61	695.	70.	-275.	1.	88893	398
	920123	042156.37	642.	65.	-279.	0.	88893	398
	920123	042305.72	552.	58.	-283.	1.	88893	398
	920124	012108.74	1653.	126.	-272.	-1.	88893	398
	920124	012141.64	1597.	125.	-276.	-1.	88893	398
	920124	012225.80	1522.	123.	-280.	-0.	88893	398
	920127	011746.77	1619.	209.	-508.	-2.	88893	398
	920127	011800.41	1596.	203.	-511.	-1.	88893	398
	920127	011818.20	1566.	207.	-514.	-1.	88893	398
88895	27.50	537.69	.0003	67 001 0	315.86	920209		
	920211	185858.68	1474.	5.	-31.	-46.	89298	243
	920211	185920.40	1516.	-6.	-141.	-34.	89298	243
	920211	185956.86	1568.	-15.	-261.	-20.	89298	243
88917	8.01	546.84	-.0556	00 000 0	305.41	920128		
	920205	025353.20	1327.	-722.	87.	29.	15390	398
	920202	020649.86	2318.	-410.	-515.	-4.	88917	399
	920202	020730.47	2406.	-409.	-505.	-5.	88917	398
	920211	223247.69	623.	64.	302.	2.	90462	385
	920211	223258.96	635.	61.	298.	-8.	94750	399
	920211	223337.13	693.	65.	296.	-3.	94750	399
	920211	223404.43	735.	67.	264.	-3.	94750	399
	920211	223435.15	788.	72.	291.	-3.	94750	399
	920211	223510.96	847.	75.	289.	-4.	94750	399
88919	26.96	606.97	-.0901	00 000 0	272.93	920116		
	920211	220531.05	268.	-1047.	549.	19.	94745	399
88922	56.59	277.06	-.0296	00 000 0	128.98	920211		
	920211	044449.29	802.	275.	-1247.	22.	94695	399
88924	24.39	329.13	-.0723	67 001 0	336.83	911211		
	920205	025553.06	1132.	236.	-2567.	-3.	15390	398
88928	66.50	715.35	.0032	00 000 0	191.57	911225		

SAT	INC DATE	PERIOD TIME	DRAG ALT	INTL DESIG ΔU	R.A. ΔV	EPOCH ΔW	TAG	SENSOR
	920211	050435.26	10324.	277.	-711.	-3.	21854	369
88931	26.42	465.40	-.0486	67 001 0	244.49	920202		
	920211	201906.84	201.	-17.	572.	-0.	90249	383
	920211	201926.93	210.	-10.	572.	-0.	90249	383
	920211	201937.00	215.	-7.	572.	-0.	90249	383
	920211	201947.02	220.	-4.	571.	-0.	90249	383
	920211	201957.06	225.	-0.	571.	0.	90249	383
	920211	202017.15	237.	5.	570.	0.	90249	383
	920211	202027.19	244.	10.	569.	-1.	90249	383
	920211	202037.24	250.	13.	569.	1.	90249	383
	920211	202047.28	257.	17.	568.	1.	90249	383
	920211	202057.32	264.	20.	567.	1.	90249	383
88933	26.32	289.06	-.2307	00 000 0	78.05	920105		
	920211	100816.72	2057.	729.	-1319.	-14.	89813	232
88934	47.52	262.67	-.0701	00 000 0	61.49	911210		
	920210	200459.89	3919.	-8.	2990.	-11.	82080	222

APPENDIX D. EVALUATOR RANKINGS

Internally, the expert system only uses the numerical rankings provided by the evaluator for the processing of UCTs. The printout in this enclosure serves as a tool for verification and debugging the performance of the system.

Each line represents a single track. Table VIII explains the meaning of each column of data.

TABLE VIII. CONTENTS OF EVALUATOR PRINTOUT

COLUMN HEADING	CONTENTS
SAT	NAVSPASUR satellite identification number
SNSR	Sensor that produced the track
DATE	Date track was observed in YYMMDD
TIME	Time track was observed in HHMMSS.HH
OBS	Number of observations in the track. A fuzzy variable
U	ΔU error. A fuzzy variable
V	ΔV error. A fuzzy variable
W	ΔW error. A fuzzy variable
W>10	Number of ΔW errors in the track that are greater than ten
FH	The front half, a NAVSPASUR term. If true, indicates that the ranking of the track was adjusted because it came from a sensor assumed to produce only good data
HALO	Halo. If true, indicates that the ranking of the track was adjusted because of its similarity to other tracks assigned to the same satellite
AGE	Age. If true, indicates that the ranking of the track was adjusted because its date is significantly different from that of the satellite's element set
σ	Standard deviation. If true, indicates that the ranking of the track was adjusted because of large variations in the ΔU or the ΔV errors
RANK	The evaluator's ranking of the track
EXPERT	Expert's opinion of the track. YES indicates an attempt was made to fit the track to the orbital catalog

SAT	SNSR	DATE	TIME	OBS	U	V	W	W>10	IO	FH	HALO	AGE	σ	RANK	EXPERT
21854	369	920211	035325.95	100	69	0	91	100	100	T	F	T	F	100	YES
21854	369	920211	050100.73	100	68	0	93	100	100	T	F	T	F	100	YES
21854	369	920211	022437.88	100	81	0	92	100	100	T	F	T	F	100	YES
21538	334	920207	071500.69	0	0	0	31	100	100	T	F	F	F	100	YES
3899	396	920116	052633.12	0	0	0	69	100	100	T	F	F	F	100	YES
21854	404	920211	041331.80	100	68	0	48	70	100	T	F	T	T	100	YES
21855	369	920211	023724.93	100	99	53	69	100	100	T	F	F	F	100	YES
8547	334	920211	165652.54	100	79	35	91	100	100	T	F	F	T	100	YES
17253	334	920114	103256.76	80	75	88	61	80	100	T	F	T	F	100	YES
15758	396	920211	104746.33	40	34	0	96	100	100	T	F	T	F	100	YES
17253	334	920114	105051.82	60	78	90	0	50	100	T	F	T	F	100	YES
15390	398	920205	025047.47	100	93	91	100	100	100	F	F	F	F	100	YES
15390	398	920206	050941.81	0	0	0	100	100	100	F	T	F	F	100	YES
19111	396	920211	195216.51	40	99	95	100	100	100	T	F	T	F	100	YES
87302	396	920122	023430.37	40	21	0	75	100	100	T	F	T	F	100	YES
18955	396	920211	065624.74	40	99	98	11	0	100	T	F	F	F	100	YES
87302	396	920121	021310.78	40	0	0	75	100	100	T	F	T	F	100	YES
87302	396	920124	123825.29	40	86	0	100	100	100	T	F	T	F	100	YES
21855	369	920211	052003.77	100	99	52	73	100	100	T	F	F	F	100	YES
21854	369	920211	030916.93	80	74	0	95	100	100	T	F	T	T	100	YES
10617	396	920211	182910.50	20	99	100	85	100	100	T	F	F	F	100	YES
21854	369	920211	030327.21	100	75	0	94	100	100	T	F	T	F	100	YES
87302	396	920122	120013.03	40	39	0	100	100	100	T	F	T	F	100	YES
14362	396	920211	020456.34	40	96	49	94	100	100	T	F	F	F	100	YES
88769	334	920211	124356.87	80	56	77	68	100	100	T	F	T	F	100	YES
11332	396	920211	091102.01	20	100	100	100	100	100	T	F	F	F	100	YES
88629	334	920211	123620.44	80	87	93	34	60	100	T	F	T	F	100	YES
87302	396	920120	125531.79	40	0	0	96	100	100	T	F	T	F	100	YES
87272	396	920211	194016.37	40	92	98	0	0	100	T	F	F	F	100	YES
13464	396	920211	065548.75	40	97	43	100	100	100	T	F	F	F	100	YES
2865	369	920211	041558.43	100	96	95	0	0	100	T	F	F	F	100	YES
15390	398	920205	120903.59	100	91	89	97	100	100	F	F	F	F	99	YES
15390	398	920204	143150.82	100	95	94	94	100	100	F	F	F	F	99	YES
15390	398	920207	072808.50	100	98	73	97	100	100	F	F	T	F	99	YES
15390	398	920206	094834.08	100	91	81	100	100	100	F	F	T	F	99	YES
15390	398	920206	142622.62	100	86	85	90	100	100	F	F	T	F	99	YES
85892	398	920126	220010.21	40	60	62	92	100	100	F	F	T	F	99	YES
88788	398	920131	052028.33	0	32	0	85	100	100	F	T	F	F	99	YES
15390	398	920208	050436.75	100	81	67	100	100	100	F	F	T	F	99	YES
88893	398	920124	012108.74	40	66	65	95	100	100	F	F	T	F	99	YES
88892	398	920128	232902.17	40	61	56	84	100	100	F	F	T	F	99	YES
15390	398	920209	023657.23	100	67	65	95	100	100	F	F	T	F	99	YES
15390	398	920208	215222.16	100	72	78	75	100	100	F	F	T	F	99	YES
15390	398	920207	120331.15	100	82	77	93	100	100	F	F	T	F	99	YES
88788	398	920129	235105.84	100	96	95	82	100	100	F	F	T	F	99	YES
21692	398	920114	201731.99	100	66	63	95	100	100	F	F	T	F	99	YES
15390	398	920209	072238.54	100	93	52	96	100	100	F	F	T	F	99	YES
88931	383	920211	201906.84	100	98	47	96	100	0	F	F	T	F	99	YES
15390	398	920210	093716.01	100	81	40	91	100	100	F	F	T	F	99	YES
15390	398	920210	045915.51	0	0	0	100	100	100	F	T	F	F	99	YES
88072	398	920202	124621.80	100	93	41	79	100	100	F	F	T	F	99	YES
88075	399	920210	235311.23	80	77	31	91	100	100	F	F	T	F	99	YES
15390	398	920208	094258.60	100	85	65	94	100	100	F	F	T	F	99	YES
20672	398	920201	114236.23	40	86	81	76	100	100	F	F	T	F	99	YES
88048	398	920130	013501.19	100	93	67	72	100	100	F	F	T	F	99	YES
86032	398	920131	233733.43	100	69	54	75	100	100	F	F	T	F	99	YES
15390	398	920209	115754.19	100	70	59	92	100	100	F	F	T	F	99	YES
88079	398	920204	110819.68	100	39	0	86	100	100	F	F	T	F	97	YES
88079	399	920211	080906.00	0	0	0	85	100	0	F	T	F	F	97	YES
18601	399	920211	051519.34	80	71	57	77	100	100	F	F	T	F	97	YES
88893	398	920127	011746.77	40	44	36	91	100	100	F	F	T	F	96	YES
88893	398	920123	042117.61	40	82	65	95	100	100	F	F	T	F	96	YES
88917	399	920211	223258.96	80	87	76	72	100	0	F	F	T	F	95	YES
88917	399	920202	020649.86	0	0	0	69	100	100	F	T	F	F	95	YES

SAT	SNSR	DATE	TIME	OBS	U	V	W	W>10	ID	FH	HALO	AGE	σ	RANK	EXPERT
88917	398	920202	020730.47	0	0	0	62	100	100	F	T	F	F	95	YES
88079	398	920205	130417.49	80	0	0	96	100	100	F	F	T	F	91	YES
88850	383	920211	025439.64	80	99	94	53	100	0	F	F	T	F	91	YES
88048	398	920127	004924.94	100	99	82	35	50	100	F	F	T	F	90	YES
87336	396	920211	095954.57	80	96	29	89	100	0	F	F	T	F	89	YES
88893	398	920119	025118.25	40	96	95	94	100	100	F	F	F	F	89	YES
88893	398	920121	012227.11	40	85	86	94	100	100	F	F	F	F	88	YES
15390	398	920204	220712.12	40	94	95	86	100	100	F	F	F	F	87	YES
87869	399	920211	220531.05	100	99	50	88	100	0	F	F	T	F	85	YES
88120	399	920211	104534.61	100	66	0	94	100	0	F	F	T	F	85	YES
88079	398	920208	132305.70	40	0	0	96	100	100	F	F	T	F	84	YES
21058	399	920211	060621.80	100	100	100	95	100	0	F	F	F	F	84	YES
20947	399	920211	080512.09	100	100	100	95	100	0	F	F	F	F	84	YES
88892	398	920206	213722.87	20	7	18	100	100	100	F	F	T	F	84	YES
87869	396	920211	012726.24	80	98	51	94	100	0	F	F	T	F	84	YES
20171	385	920211	090645.29	100	99	100	92	100	0	F	F	F	F	83	YES
14362	399	920211	124613.90	60	93	35	97	100	100	F	F	F	F	83	YES
19994	399	920205	214636.98	40	0	0	87	100	100	F	F	T	F	82	YES
87376	393	920211	182446.10	80	69	0	97	100	0	F	F	T	F	81	YES
88079	399	920211	134139.59	40	0	0	86	100	100	F	F	T	F	81	YES
20171	385	920211	090347.41	100	99	100	85	100	0	F	F	F	F	81	YES
19994	399	920204	215559.39	40	15	0	85	100	100	F	F	T	F	81	YES
88079	398	920211	134139.59	40	0	0	86	100	100	F	F	T	F	81	YES
20596	385	920211	113638.66	100	95	92	86	100	0	F	F	F	F	81	YES
88446	399	920211	135416.12	80	62	0	96	100	0	F	F	T	F	80	YES
11343	242	920210	225629.64	60	100	100	100	100	0	F	F	F	F	79	NO
19994	399	920201	222215.38	40	85	39	81	100	100	F	F	T	F	79	YES
88079	398	920207	112808.80	20	1	0	90	100	100	F	F	T	F	79	YES
88079	398	920210	114604.06	20	0	0	93	100	100	F	F	T	F	79	YES
88079	398	920209	095244.27	20	12	0	83	100	100	F	F	T	F	78	YES
87373	396	920211	061147.69	60	89	0	92	100	0	F	F	T	F	77	YES
19994	399	920203	220516.73	40	49	0	81	100	100	F	F	T	F	77	YES
13878	241	920211	174525.20	0	100	0	77	100	0	F	T	F	F	77	NO
13878	242	920211	174407.61	80	100	94	81	100	0	F	F	F	F	77	NO
13878	241	920211	174459.73	0	100	0	77	100	0	F	T	F	F	77	NO
13878	241	920211	174808.02	0	100	0	85	100	0	F	T	F	F	77	NO
11145	242	920211	174250.79	100	100	99	69	100	0	F	F	F	F	76	NO
7831	395	920210	223448.82	100	99	98	67	100	0	F	F	F	F	75	NO
13464	399	920211	064413.52	20	97	44	100	100	100	F	F	F	F	75	NO
21538	387	920203	113048.14	20	15	15	94	100	100	F	F	T	F	75	NO
15826	951	920211	085933.98	60	100	98	85	100	0	F	F	F	F	74	NO
7324	242	920210	223733.02	60	100	100	85	100	0	F	F	F	F	74	YES
13878	241	920211	175728.50	60	100	98	82	100	0	F	F	F	F	73	NO
13878	241	920211	173652.59	0	100	0	62	100	0	F	T	F	F	72	NO
13878	242	920211	174036.02	80	100	92	71	100	0	F	F	F	F	72	NO
21223	383	920211	144226.11	100	99	100	64	90	0	F	F	F	F	72	YES
88838	232	920211	092047.21	60	3	30	88	100	0	F	F	T	F	72	YES
20596	382	920211	113849.79	100	94	93	60	100	0	F	F	F	F	71	YES
15206	221	920210	200204.24	60	92	0	70	100	0	F	F	T	F	69	NO
87153	396	920211	175600.24	80	96	42	94	100	0	F	F	F	F	69	YES
8513	242	920210	224108.97	60	100	100	69	100	0	F	F	F	F	68	YES
11145	241	920211	173616.76	60	100	99	69	100	0	F	F	F	F	67	NO
11145	241	920211	175728.50	60	100	99	67	100	0	F	F	F	F	67	NO
11145	242	920211	173743.47	60	100	99	69	100	0	F	F	F	F	67	NO
11145	242	920211	173350.45	60	100	99	69	100	0	F	F	F	F	67	NO
11145	242	920211	174036.02	60	99	99	69	100	0	F	F	F	F	67	NO
19437	396	920211	064921.49	60	100	46	100	100	0	F	F	F	F	67	YES
87356	393	920211	130900.40	60	1	0	78	100	0	F	F	T	F	65	YES
13878	242	920211	173743.47	60	100	91	62	100	0	F	F	F	F	62	NO
13878	241	920211	173616.76	0	96	0	54	100	0	F	T	F	F	62	NO
20946	951	920211	085933.98	60	99	96	54	100	0	F	F	F	F	60	YES
21854	399	920211	174937.89	20	44	0	55	100	100	F	F	T	F	59	YES
21858	369	920211	052003.77	100	85	0	86	100	0	F	F	F	F	59	NO
88079	398	920209	151846.06	0	0	0	77	100	100	F	T	F	F	59	YES

SAT	SNSR	DATE	TIME	OBS	U	V	W	W>10	ID	FH	HALO	AGE	σ	RANK	EXPERT
88079	398	920206	145927.72	80	0	3	88	100	100	F	F	T	T	59	YES
88079	398	920207	165639.68	0	0	0	77	100	100	F	T	F	F	59	YES
13878	242	920211	173350.45	60	100	89	54	100	0	F	F	F	F	58	NO
4637	396	920211	061511.19	0	100	97	100	100	0	F	F	F	F	58	YES
87153	399	920211	041108.28	0	76	0	100	100	100	F	F	F	F	58	YES
87332	393	920211	125447.90	80	84	0	96	100	0	F	F	F	F	57	YES
88856	399	920211	000143.45	20	100	99	53	50	100	F	F	F	F	57	YES
14783	242	920210	223358.66	60	100	100	46	100	0	F	F	F	F	57	YES
20261	385	920210	234322.80	60	98	99	48	100	0	F	F	F	F	57	NO
14783	242	920210	223052.30	60	100	100	44	100	0	F	F	F	F	56	YES
21855	399	920211	023942.32	40	98	53	45	67	100	F	F	F	F	56	YES
14086	242	920210	225302.73	60	100	100	38	100	0	F	F	F	F	54	NO
14086	242	920210	224923.21	60	100	100	38	100	0	F	F	F	F	54	NO
14557	399	920211	051519.34	80	64	0	93	100	0	F	F	F	F	54	NO
88108	221	920210	211716.37	60	99	97	38	100	0	F	F	F	F	53	YES
21858	369	920211	023724.93	100	87	0	67	100	0	F	F	F	F	53	NO
21764	399	920211	212636.05	20	78	87	54	50	100	F	F	F	F	53	NO
21858	399	920211	021948.96	100	86	0	67	100	0	F	F	F	F	53	NO
21855	399	920211	021948.96	60	98	53	31	50	100	F	F	F	F	52	YES
16214	222	920211	120229.50	100	100	99	29	67	0	F	F	F	F	52	NO
88108	243	920211	185826.02	60	100	96	31	100	0	F	F	F	F	50	YES
88788	398	920201	003122.15	0	0	0	92	100	100	F	F	F	F	50	YES
87365	396	920211	100130.79	20	99	35	85	100	0	F	F	T	F	50	YES
87117	399	920211	141607.67	0	0	0	92	100	100	F	F	F	F	50	YES
13464	399	920211	174723.14	0	0	0	92	100	100	F	F	F	F	50	NO
13464	399	920211	174723.14	0	0	0	92	100	100	F	F	F	F	50	NO
21764	329	920211	002941.04	20	90	85	96	100	0	T	F	F	F	50	YES
20799	242	920210	224446.40	100	87	0	0	0	0	F	F	T	F	49	NO
15206	221	920210	195115.32	100	92	0	0	0	0	F	F	T	F	49	NO
13878	241	920211	173725.84	20	100	90	62	100	0	F	F	F	F	48	NO
21872	393	920211	183630.87	20	98	73	96	100	0	F	F	F	T	48	NO
21871	393	920211	183528.97	20	91	47	91	100	0	F	F	F	F	48	NO
3899	743	920126	083727.69	0	0	0	85	100	100	F	F	F	F	48	NO
16262	232	920211	091752.36	40	95	44	77	100	0	F	F	F	F	48	NO
18270	396	920211	040952.82	60	99	68	46	100	0	F	F	F	F	48	NO
88075	399	920210	235354.29	100	0	2	0	30	0	F	F	T	F	48	NO
87117	399	920211	104551.42	0	0	0	85	100	100	F	F	F	F	48	YES
88083	399	920210	235329.99	100	24	8	0	17	0	F	F	T	F	47	NO
2215	232	920211	084751.73	60	87	32	35	75	0	F	F	T	F	46	NO
87333	232	920211	094315.63	60	27	67	63	100	0	F	F	F	F	46	NO
87345	329	920211	080948.96	40	98	89	66	100	0	T	F	F	F	46	NO
12677	242	920210	224108.97	40	100	95	0	0	0	F	F	T	F	45	NO
19113	396	920211	041222.66	80	60	0	71	100	0	F	F	F	F	45	NO
87455	232	920211	053635.68	100	75	74	81	100	0	F	F	F	T	45	NO
12677	242	920210	232656.94	60	99	69	0	0	0	F	F	T	F	44	NO
14515	396	920211	033825.09	80	0	0	77	100	0	F	F	F	F	44	NO
6278	242	920210	232656.94	60	50	0	86	100	0	F	F	F	F	44	NO
88076	399	920211	085821.51	60	66	55	36	25	0	F	F	T	F	44	NO
87207	232	920211	073348.76	20	63	0	38	100	0	F	F	T	F	44	NO
87715	329	920211	003102.63	0	92	80	100	100	0	T	F	F	F	44	NO
87372	399	920211	090543.31	0	32	67	100	100	0	F	F	F	F	44	NO
88072	242	920211	173743.47	60	84	0	31	50	0	F	F	T	F	43	NO
88079	398	920205	183534.10	0	0	0	62	100	100	F	F	F	F	43	YES
17307	329	920211	081411.31	0	92	97	85	100	0	T	F	F	F	42	NO
14665	382	920211	220610.58	0	68	50	92	100	0	F	F	F	F	41	NO
6058	382	920211	180652.43	0	84	23	100	100	0	F	F	F	F	41	NO
21872	393	920211	183437.73	0	100	0	100	100	0	F	F	F	F	41	NO
11622	242	920210	224446.40	60	69	0	72	100	0	F	F	F	F	40	NO
12715	393	920211	224222.40	80	34	0	62	100	0	F	F	F	F	40	NO
21872	393	920211	183720.87	0	100	17	92	100	0	F	F	F	F	40	NO
21872	393	920211	183811.07	0	100	17	92	100	0	F	F	F	F	40	NO
11848	329	920211	032935.70	20	97	100	61	100	0	T	F	F	F	40	NO
15206	221	920210	201942.02	60	91	0	0	0	0	F	F	T	F	39	NO
19464	951	920211	085933.98	60	89	11	0	0	0	F	F	T	F	39	NO

SAT	SNSR	DATE	TIME	OBS	U	V	W	W>10	ID	FH	HALO	AGE	σ	RANK	EXPERT
8980	221	920210	200204.24	0	88	73	69	100	0	F	F	F	F	39	NO
21670	221	920210	195115.32	60	0	0	0	25	0	F	F	T	F	39	NO
87711	232	920211	092047.21	20	64	0	94	100	0	F	F	F	F	38	NO
21872	393	920211	183540.87	0	92	13	92	100	0	F	F	F	F	38	NO
15994	951	920211	085933.98	60	78	0	62	100	0	F	F	F	F	38	NO
21872	393	920211	183529.03	0	100	0	92	100	0	F	F	F	F	38	NO
1864	242	920210	230710.23	20	92	72	56	100	0	F	F	F	F	38	NO
21872	393	920211	183449.70	0	92	13	92	100	0	F	F	F	F	38	NO
21872	393	920211	183414.27	0	76	0	100	100	0	F	F	F	F	38	NO
18538	396	920211	040952.82	60	22	0	29	75	0	F	F	T	F	38	NO
14086	242	920210	223733.02	60	91	0	59	100	0	F	F	F	F	38	NO
21872	393	920211	183709.03	0	96	0	92	100	0	F	F	F	F	37	NO
6826	232	920211	090126.29	20	94	86	41	100	0	F	F	F	F	37	NO
21872	393	920211	183735.50	0	64	0	100	100	0	F	F	F	F	37	NO
20672	222	920211	120805.44	80	0	0	0	0	0	F	F	T	T	37	NO
21872	393	920211	183759.23	0	92	0	92	100	0	F	F	F	F	37	NO
21011	404	920211	041331.80	100	0	0	44	85	0	F	F	F	F	37	NO
11353	242	920210	224108.97	20	100	68	0	0	0	F	F	T	F	37	NO
21872	393	920211	183619.03	0	96	0	92	100	0	F	F	F	F	37	NO
21872	393	920211	183505.27	0	72	0	100	100	0	F	F	F	F	37	NO
21872	393	920211	183555.27	0	72	0	100	100	0	F	F	F	F	37	NO
21538	329	920131	030344.99	0	0	0	77	100	100	T	F	F	F	36	NO
88086	382	920211	035908.09	40	0	0	0	33	0	F	F	T	F	36	NO
13554	242	920210	223733.02	60	35	0	66	100	0	F	F	F	F	36	NO
5795	393	920211	131148.50	0	0	37	92	100	0	F	F	F	F	36	NO
13554	242	920211	173350.45	60	1	0	65	100	0	F	F	F	F	36	NO
87316	242	920210	223358.66	20	87	64	0	0	0	F	F	T	F	36	NO
13814	231	920211	104037.63	20	83	20	81	100	0	F	F	F	F	36	NO
88119	334	920211	130618.89	100	23	52	0	0	0	F	F	T	F	36	NO
20581	393	920211	183619.63	0	0	0	100	100	0	F	F	F	F	35	NO
20581	393	920211	183555.27	0	0	0	100	100	0	F	F	F	F	35	NO
20581	393	920211	183609.77	0	0	0	100	100	0	F	F	F	F	35	NO
21326	398	920201	003122.15	0	0	0	100	100	0	F	F	F	F	35	NO
10829	231	920211	103708.06	0	0	0	100	100	0	F	F	F	F	35	NO
11145	242	920211	175001.63	100	100	97	0	0	0	F	F	F	F	35	NO
10444	396	920211	074246.53	0	0	0	100	100	0	F	F	F	F	35	NO
21870	393	920211	183437.73	0	8	0	100	100	0	F	F	F	F	35	NO
20581	393	920211	183519.73	0	0	0	100	100	0	F	F	F	F	35	NO
20581	393	920211	183645.27	0	0	0	100	100	0	F	F	F	F	35	NO
12155	396	920211	012736.11	0	0	0	100	100	0	F	F	F	F	35	NO
20581	393	920211	183659.87	0	0	0	100	100	0	F	F	F	F	35	NO
20581	393	920211	183759.23	0	0	0	100	100	0	F	F	F	F	35	NO
21870	393	920211	183449.70	0	28	0	100	100	0	F	F	F	F	35	NO
21871	393	920211	183609.77	0	0	0	100	100	0	F	F	F	F	35	NO
21871	393	920211	183645.27	0	0	0	100	100	0	F	F	F	F	35	NO
21870	393	920211	183759.23	0	8	0	100	100	0	F	F	F	F	35	NO
21872	393	920211	183659.87	0	8	0	100	100	0	F	F	F	F	35	NO
21871	393	920211	183437.73	0	24	0	100	100	0	F	F	F	F	35	NO
21871	393	920211	183735.50	0	0	0	100	100	0	F	F	F	F	35	NO
21872	393	920211	183609.77	0	8	0	100	100	0	F	F	F	F	35	NO
21870	393	920211	183709.03	0	8	0	100	100	0	F	F	F	F	35	NO
8178	221	920230	210033.55	0	96	0	85	100	0	F	F	F	F	35	NO
21870	393	920211	183529.03	0	8	0	100	100	0	F	F	F	F	35	NO
21869	393	920211	183414.27	0	0	0	100	100	0	F	F	F	F	35	NO
3874	399	920211	102022.85	0	0	0	100	100	0	F	F	F	F	35	NO
3899	329	920121	101515.05	0	0	0	69	100	100	T	F	F	F	35	NO
115	221	920211	144034.02	20	82	87	41	100	0	F	F	F	F	35	NO
20581	393	920211	183505.27	0	0	0	100	100	0	F	F	F	F	35	NO
16375	396	920211	061147.69	0	0	0	100	100	0	F	F	F	F	35	NO
956	384	920207	161921.30	0	0	0	100	100	0	F	F	F	F	35	NO
18591	399	920211	223833.29	0	0	0	100	100	0	F	F	F	F	35	NO
19502	232	920211	093241.74	0	80	0	92	100	0	F	F	F	F	35	NO
20581	393	920211	183437.73	0	0	0	100	100	0	F	F	F	F	35	NO
3908	221	920210	211939.45	0	0	0	100	100	0	F	F	F	F	35	NO

SAT	SNSR	DATE	TIME	OBS	U	V	W	W>10	ID	FH	HALO	AGE	σ	RANK	EXPERT
21870	393	920211	183636.87	0	28	0	100	100	0	F	F	F	F	35	NO
21872	393	920211	183437.80	0	100	0	85	100	0	F	F	F	F	35	NO
5498	242	920211	175147.94	0	0	0	100	100	0	F	F	F	F	35	NO
87037	399	920211	221310.03	0	0	0	100	100	0	F	F	F	F	35	NO
7017	398	920202	213449.99	0	0	0	100	100	0	F	F	F	F	35	NO
19590	383	920211	131850.04	0	0	0	100	100	0	F	F	F	F	35	NO
20581	393	920211	183414.27	0	0	0	100	100	0	F	F	F	F	35	NO
87117	399	920211	000946.59	0	0	0	100	100	0	F	F	F	F	35	YES
5144	232	920211	073428.79	0	0	0	100	100	0	F	F	F	F	35	NO
12993	232	920211	082926.77	60	41	0	64	100	0	F	F	F	F	35	NO
21872	393	920211	183519.73	0	12	0	100	100	0	F	F	F	F	35	NO
88111	242	920211	173350.45	60	60	0	59	100	0	F	F	F	F	35	NO
21872	393	920211	183528.97	0	96	0	85	100	0	F	F	F	F	35	NO
88079	383	920211	131840.00	20	0	0	9	50	0	F	F	T	F	35	NO
21871	393	920211	183709.03	0	24	0	100	100	0	F	F	F	F	35	NO
21872	393	920211	183429.73	0	16	0	100	100	0	F	F	F	F	35	NO
21872	393	920211	183338.67	0	16	0	100	100	0	F	F	F	F	35	NO
21871	393	920211	183659.87	0	0	0	100	100	0	F	F	F	F	35	NO
87386	221	920210	211939.45	0	20	0	100	100	0	F	F	F	F	35	NO
14909	385	920211	223247.69	0	0	0	100	100	0	F	F	F	F	35	NO
21872	393	920211	183618.97	0	96	0	85	100	0	F	F	F	F	35	NO
14621	393	920211	142857.40	0	4	0	100	100	0	F	F	F	F	35	NO
13878	242	920211	175040.69	100	100	100	0	0	0	F	F	F	F	35	NO
20581	393	920211	183735.50	0	0	0	100	100	0	F	F	F	F	35	NO
20581	393	920211	183709.03	0	0	0	100	100	0	F	F	F	F	35	NO
21870	393	920211	183540.87	0	28	0	100	100	0	F	F	F	F	35	NO
21871	393	920211	183505.27	0	0	0	100	100	0	F	F	F	F	35	NO
21871	393	920211	183414.27	0	0	0	100	100	0	F	F	F	F	35	NO
21870	393	920211	183811.07	0	28	0	100	100	0	F	F	F	F	35	NO
21870	393	920211	183720.87	0	28	0	100	100	0	F	F	F	F	35	NO
21870	393	920211	183735.50	0	0	0	100	100	0	F	F	F	F	35	NO
21870	393	920211	183645.27	0	0	0	100	100	0	F	F	F	F	35	NO
21871	393	920211	183555.27	0	0	0	100	100	0	F	F	F	F	35	NO
10226	385	920124	052920.50	0	80	0	92	100	0	F	F	F	F	35	NO
21871	393	920211	183619.03	0	24	0	100	100	0	F	F	F	F	35	NO
21870	393	920211	183619.03	0	8	0	100	100	0	F	F	F	F	35	NO
88072	241	920211	173652.59	40	85	0	0	33	0	F	F	T	F	34	NO
14096	231	920211	064649.66	0	72	0	92	100	0	F	F	F	F	34	NO
20672	398	920204	111014.06	20	0	0	0	50	0	F	F	T	F	34	NO
6985	393	920211	191448.82	0	72	0	92	100	0	F	F	F	F	34	NO
88111	241	920211	174913.11	60	52	0	58	100	0	F	F	F	F	34	NO
21872	393	920211	183708.97	0	92	0	85	100	0	F	F	F	F	34	NO
7648	242	920210	225629.64	60	0	0	59	100	0	F	F	F	F	34	NO
15206	951	920211	085933.98	40	17	0	0	0	0	F	F	T	F	34	NO
21872	393	920211	183759.13	0	92	0	85	100	0	F	F	F	F	34	NO
20581	393	920211	183720.87	0	0	0	92	100	0	F	F	F	F	33	NO
20581	393	920211	183759.13	0	0	0	92	100	0	F	F	F	F	33	NO
20581	393	920211	183708.97	0	0	0	92	100	0	F	F	F	F	33	NO
21870	393	920211	183338.67	0	0	0	92	100	0	F	F	F	F	33	NO
21870	393	920211	183414.27	0	0	0	92	100	0	F	F	F	F	33	NO
21869	393	920211	183709.03	0	0	0	92	100	0	F	F	F	F	33	NO
21869	393	920211	183645.27	0	0	0	92	100	0	F	F	F	F	33	NO
10178	399	920211	025141.64	0	0	0	92	100	0	F	F	F	F	33	NO
21870	393	920211	183659.87	0	0	0	92	100	0	F	F	F	F	33	NO
21869	393	920211	183759.23	0	0	0	92	100	0	F	F	F	F	33	NO
21870	393	920211	183519.73	0	0	0	92	100	0	F	F	F	F	33	NO
21870	393	920211	183555.27	0	0	0	92	100	0	F	F	F	F	33	NO
20581	393	920211	183630.87	0	0	0	92	100	0	F	F	F	F	33	NO
20717	393	920211	025539.90	0	0	0	92	100	0	F	F	F	F	33	NO
20674	369	920211	172039.88	0	0	0	92	100	0	F	F	F	F	33	NO
20674	369	920211	172039.88	0	0	0	92	100	0	F	F	F	F	33	NO
10144	398	920129	235511.74	0	0	0	92	100	0	F	F	F	F	33	NO
20581	393	920211	183618.97	0	0	0	92	100	0	F	F	F	F	33	NO
20581	393	920211	183540.87	0	0	0	92	100	0	F	F	F	F	33	NO

SAT	SNSR	DATE	TIME	OBS	U	V	W	W>10	ID	FH	HALO	AGE	σ	RANK	EXPERT
13554	241	920211	173616.76	60	1	0	56	100	0	F	F	F	F	33	NO
20581	393	920211	183811.07	0	0	0	92	100	0	F	F	F	F	33	NO
21871	393	920211	183429.73	0	0	0	92	100	0	F	F	F	F	33	NO
21870	393	920211	183429.73	0	0	0	92	100	0	F	F	F	F	33	NO
21869	393	920211	183437.73	0	0	0	92	100	0	F	F	F	F	33	NO
21870	393	920211	183505.27	0	0	0	92	100	0	F	F	F	F	33	NO
87117	399	920211	104520.79	0	0	0	92	100	0	F	F	F	F	33	YES
88010	221	920211	141657.85	20	0	0	0	0	0	F	F	T	F	33	NO
21870	393	920211	183609.77	0	0	0	92	100	0	F	F	F	F	33	NO
21869	393	920211	183529.03	0	0	0	92	100	0	F	F	F	F	33	NO
21869	393	920211	183505.27	0	0	0	92	100	0	F	F	F	F	33	NO
21869	393	920211	183619.03	0	0	0	92	100	0	F	F	F	F	33	NO
4201	393	920211	185325.93	0	0	0	92	100	0	F	F	F	F	33	NO
87387	393	920231	185325.93	0	0	0	92	100	0	F	F	F	F	33	NO
12869	399	920211	051554.33	0	0	0	92	100	0	F	F	F	F	33	NO
12388	393	920211	131534.37	0	0	0	92	100	0	F	F	F	F	33	NO
11708	242	920210	223607.20	0	0	0	92	100	0	F	F	F	F	33	NO
10417	399	920113	055509.32	0	0	0	92	100	0	F	F	F	F	33	NO
87333	393	920211	191017.87	0	0	0	92	100	0	F	F	F	F	33	NO
19995	396	920211	074236.71	0	0	0	92	100	0	F	F	F	F	33	NO
19950	399	920213	152431.18	0	0	0	92	100	0	F	F	F	F	33	NO
20581	393	920211	183449.70	0	0	0	92	100	0	F	F	F	F	33	NO
20581	393	920211	183437.80	0	0	0	92	100	0	F	F	F	F	33	NO
5192	399	920211	171451.74	0	0	0	92	100	0	F	F	F	F	33	NO
20581	393	920211	183529.03	0	0	0	92	100	0	F	F	F	F	33	NO
20581	393	920211	183429.73	0	0	0	92	100	0	F	F	F	F	33	NO
19611	369	920211	125727.81	0	0	0	92	100	0	F	F	F	F	33	NO
19611	369	920211	125727.81	0	0	0	92	100	0	F	F	F	F	33	NO
20581	393	920211	183338.67	0	0	0	92	100	0	F	F	F	F	33	NO
11791	222	920210	201818.77	0	0	0	92	100	0	F	F	F	F	33	NO
19479	383	920211	131850.04	20	0	0	0	0	0	F	F	T	F	33	NO
5795	396	920211	061511.19	0	0	0	92	100	0	F	F	F	F	33	NO
21869	393	920211	183449.70	0	0	0	92	100	0	F	F	F	F	33	NO
13780	399	920211	035324.88	0	0	0	92	100	0	F	F	F	F	33	NO
21869	393	920211	183540.87	0	0	0	92	100	0	F	F	F	F	33	NO
21869	393	920211	183735.50	0	0	0	92	100	0	F	F	F	F	33	NO
2153	385	920211	075717.88	0	0	0	92	100	0	F	F	F	F	33	NO
18689	395	920210	223458.82	0	0	0	92	100	0	F	F	F	F	33	NO
19479	398	920206	120547.77	0	0	0	92	100	0	F	F	F	F	33	NO
21869	393	920211	183555.27	0	0	0	92	100	0	F	F	F	F	33	NO
19163	404	920211	041454.07	100	96	89	0	0	0	F	F	F	F	33	NO
18955	399	920211	053140.08	0	96	70	23	0	100	F	F	F	F	33	NO
8015	399	920211	015706.30	0	0	0	92	100	0	F	F	F	F	33	NO
21871	393	920211	183708.97	0	20	0	92	100	0	F	F	F	F	32	NO
21871	393	920211	183618.97	0	20	0	92	100	0	F	F	F	F	32	NO
21871	393	920211	183759.13	0	20	0	92	100	0	F	F	F	F	32	NO
21870	393	920211	183437.80	0	4	0	92	100	0	F	F	F	F	32	NO
21871	393	920211	183540.87	0	44	0	92	100	0	F	F	F	F	32	NO
21871	393	920211	183759.23	0	24	0	92	100	0	F	F	F	F	32	NO
21870	393	920211	183759.13	0	4	0	92	100	0	F	F	F	F	32	NO
21871	393	920211	183437.80	0	20	0	92	100	0	F	F	F	F	32	NO
21871	393	920211	183811.07	0	40	0	92	100	0	F	F	F	F	32	NO
21870	393	920211	183618.97	0	4	0	92	100	0	F	F	F	F	32	NO
21870	393	920211	183708.97	0	4	0	92	100	0	F	F	F	F	32	NO
21870	393	920211	183528.97	0	4	0	92	100	0	F	F	F	F	32	NO
87394	399	920211	094420.21	20	98	0	0	0	100	F	F	T	F	32	NO
13878	241	920211	174117.68	100	100	82	0	0	0	F	F	F	F	32	NO
88083	399	920210	235311.41	40	72	29	0	33	0	F	F	T	F	32	NO
13554	242	920211	173743.47	60	1	0	50	100	0	F	F	F	F	32	NO
21871	393	920211	183630.87	0	44	0	92	100	0	F	F	F	F	32	NO
21871	393	920211	183449.70	0	44	0	92	100	0	F	F	F	F	32	NO
21871	393	920211	183720.87	0	44	0	92	100	0	F	F	F	F	32	NO
88871	334	920211	165814.93	20	78	0	0	0	0	F	F	T	F	31	NO
7714	242	920210	224108.97	0	64	0	85	100	0	F	F	F	F	31	NO

SAT	SNSR	DATE	TIME	OBS	U	V	W	W>10	ID	FH	HALO	AGE	σ	RANK	EXPERT
2868	369	920211	041558.43	100	0	0	32	61	0	F	F	F	F	31	NO
14086	242	920211	174250.79	100	99	75	0	0	0	F	F	F	F	31	NO
21282	329	920211	193756.79	0	100	0	100	100	0	T	F	F	F	31	NO
13554	242	920211	174036.02	60	1	0	45	100	0	F	F	F	F	31	NO
388	242	920210	223052.30	0	0	0	85	100	0	F	F	F	F	30	NO
17164	398	920123	042305.72	0	0	0	85	100	0	F	F	F	F	30	NO
88114	221	920211	144608.40	60	100	98	23	0	0	F	F	F	F	30	YES
12179	399	920211	153334.38	0	0	0	85	100	0	F	F	F	F	30	NO
1477	398	920205	025953.06	0	0	0	85	100	0	F	F	F	F	30	NO
21869	393	920211	183630.87	0	0	0	85	100	0	F	F	F	F	30	NO
12736	384	920207	161931.34	0	0	0	85	100	0	F	F	F	F	30	NO
5042	398	920128	232902.17	0	0	0	85	100	0	F	F	F	F	30	NO
12321	395	920211	131155.08	0	0	0	85	100	0	F	F	F	F	30	NO
21869	393	920211	183720.87	0	0	0	85	100	0	F	F	F	F	30	NO
10992	396	920211	194036.11	0	0	0	85	100	0	F	F	F	F	30	NO
21869	393	920211	183811.07	0	0	0	85	100	0	F	F	F	F	30	NO
21869	393	920211	183528.97	0	0	0	85	100	0	F	F	F	F	30	NO
21182	222	920211	121159.66	0	0	0	85	100	0	F	F	F	F	30	NO
20581	393	920211	183528.97	0	0	0	85	100	0	F	F	F	F	30	NO
21162	393	920211	191146.42	0	0	0	85	100	0	F	F	F	F	30	NO
1588	396	920211	074256.45	0	0	0	85	100	0	F	F	F	F	30	NO
88111	241	920211	174633.88	60	52	0	46	100	0	F	F	F	F	30	NO
16615	232	920211	083306.92	0	0	0	85	100	0	F	F	F	F	30	NO
10933	399	920211	051730.95	0	0	0	85	100	0	F	F	F	F	30	NO
10755	398	920114	202056.60	0	0	0	85	100	0	F	F	F	F	30	NO
21869	393	920211	183708.97	0	0	0	85	100	0	F	F	F	F	30	NO
10463	383	920211	131950.30	0	0	0	85	100	0	F	F	F	F	30	NO
21869	393	920211	183618.97	0	0	0	85	100	0	F	F	F	F	30	NO
87334	396	920211	182436.04	0	0	0	85	100	0	F	F	F	F	30	NO
5824	393	920211	191146.42	0	0	0	85	100	0	F	F	F	F	30	NO
9951	396	920211	182447.91	0	0	0	85	100	0	F	F	F	F	30	NO
15986	393	920211	220345.70	0	0	0	85	100	0	F	F	F	F	30	NO
9723	399	920211	015451.93	0	32	0	85	100	0	F	F	F	F	30	NO
88917	385	920211	223247.69	0	0	0	85	100	0	F	F	F	F	30	YES
88111	241	920211	174354.95	60	52	0	45	100	0	F	F	F	F	30	NO
87314	329	920211	130624.00	0	92	97	54	100	0	T	F	F	F	30	NO
87241	399	920211	223510.96	0	0	0	85	100	0	F	F	F	F	30	NO
8968	222	920210	201902.81	0	0	0	85	100	0	F	F	F	F	30	NO
87348	393	920211	135325.93	0	0	0	85	100	0	F	F	F	F	30	NO
19950	399	920211	152506.47	0	0	0	85	100	0	F	F	F	F	30	NO
88788	399	920211	223258.96	60	79	48	0	25	0	F	F	T	T	30	NO
20303	383	920211	030700.21	40	0	2	60	100	0	F	F	F	F	30	NO
4330	399	920211	051844.38	0	0	0	85	100	0	F	F	F	F	30	NO
3551	396	920211	184313.72	0	0	0	85	100	0	F	F	F	F	30	NO
21869	393	920211	183759.13	0	0	0	85	100	0	F	F	F	F	30	NO
3758	383	920211	144256.24	0	0	0	85	100	0	F	F	F	F	30	NO
21869	393	920211	183437.80	0	0	0	85	100	0	F	F	F	F	30	NO
700	399	920211	080552.99	0	0	0	85	100	0	F	F	F	F	30	NO
21743	243	920211	195434.07	0	0	0	85	100	0	F	F	F	F	30	NO
88111	241	920211	173616.76	60	60	0	42	100	0	F	F	F	F	29	NO
21835	396	920211	081725.53	40	99	0	45	100	0	F	F	F	F	29	NO
87346	329	920211	193756.79	0	72	100	54	100	0	T	F	F	F	29	NO
20171	385	920211	090946.74	0	60	97	31	100	0	F	F	F	F	29	NO
21506	399	920211	223404.43	0	72	0	77	100	0	F	F	F	F	29	NO
19482	243	920211	185858.68	40	92	76	60	67	0	F	F	F	T	29	NO
14401	399	920211	154301.95	60	0	0	38	100	0	F	F	F	F	29	NO
87711	232	620211	092134.88	0	0	0	77	100	0	F	F	F	F	28	NO
81005	396	920211	194026.24	0	0	0	77	100	0	F	F	F	F	28	NO
2362	396	920209	183745.81	0	0	0	77	100	0	F	F	F	F	28	NO
4330	399	920211	113507.79	0	0	0	77	100	0	F	F	F	F	28	NO
87395	398	920209	095244.27	0	0	0	77	100	0	F	F	F	F	28	NO
87151	393	920211	131309.37	0	0	0	77	100	0	F	F	F	F	28	NO
88924	398	920205	025553.06	0	0	0	77	100	0	F	F	F	F	28	NO
88928	369	920211	050435.26	0	0	0	77	100	0	F	F	F	F	28	NO

SAT	SNSR	DATE	TIME	OBS	U	V	W	W>10	IO	FH	HALO	AGE	σ	RANK	EXPERT
18527	399	920211	011415.85	0	0	0	77	100	0	F	F	F	F	28	NO
18644	393	920211	191058.55	0	0	0	77	100	0	F	F	F	F	28	NO
16720	398	920210	093807.19	0	0	0	77	100	0	F	F	F	F	28	NO
21475	398	920205	130558.03	0	0	0	77	100	0	F	F	F	F	28	NO
13911	232	920211	083534.22	0	0	0	77	100	0	F	F	F	F	28	NO
21848	398	920204	111031.90	0	0	0	77	100	0	F	F	F	F	28	NO
4158	398	920208	132305.70	0	0	0	77	100	0	F	F	F	F	28	NO
3784	399	920211	121422.99	0	0	0	77	100	0	F	F	F	F	28	NO
3748	399	920211	041004.20	0	0	0	77	100	0	F	F	F	F	28	NO
19822	232	920211	074001.84	0	0	0	77	100	0	F	F	F	F	28	NO
20572	369	920211	125135.21	0	0	0	77	100	0	F	F	F	F	28	NO
20572	369	920211	125135.21	0	0	0	77	100	0	F	F	F	F	28	NO
16719	399	920210	205626.24	0	0	0	77	100	0	F	F	F	F	28	NO
15832	399	920211	044219.88	0	0	0	77	100	0	F	F	F	F	28	NO
4654	396	920211	100130.79	0	0	0	77	100	0	F	F	F	F	28	NO
4327	242	920210	232803.48	0	64	0	77	100	0	F	F	F	F	28	NO
10184	399	920211	154334.42	0	0	0	77	100	0	F	F	F	F	28	NO
10338	399	920211	104927.81	0	0	0	77	100	0	F	F	F	F	28	NO
8789	393	920211	190627.82	0	0	0	77	100	0	F	F	F	F	28	NO
4863	393	920211	191058.55	0	0	0	77	100	0	F	F	F	F	28	NO
4981	393	920211	182853.30	0	0	0	77	100	0	F	F	F	F	28	NO
7015	399	920231	203800.34	0	64	77	0	0	100	F	F	F	F	28	NO
20805	385	920124	052920.50	0	32	0	77	100	0	F	F	F	F	27	NO
16497	222	920211	120229.50	100	94	52	0	0	0	F	F	F	F	27	NO
12139	396	920211	175606.24	80	22	0	67	100	0	F	F	F	T	27	NO
6085	232	920211	060335.96	20	94	90	50	50	0	F	F	F	F	27	NO
7324	242	920210	225302.73	60	87	0	50	75	0	F	F	F	F	27	NO
7487	243	920211	195321.20	40	85	79	44	67	0	F	F	F	F	27	NO
18965	396	920211	035934.63	40	39	0	56	100	0	F	F	F	F	27	NO
18538	396	920211	035934.63	40	0	0	0	0	0	F	F	T	F	27	NO
18418	398	920208	050528.32	0	16	0	77	100	0	F	F	F	F	27	NO
14086	241	920211	174633.88	60	100	99	0	0	0	F	F	F	F	26	NO
88112	221	920211	141612.28	60	100	100	0	0	0	F	F	F	F	26	YES
88075	951	920211	085933.98	40	0	0	0	0	0	F	F	T	T	26	NO
88082	233	920211	094537.73	20	11	0	0	0	0	F	F	T	T	26	NO
88117	231	920211	064649.66	60	100	100	0	0	0	F	F	F	F	26	YES
88120	334	920207	071228.77	100	0	0	0	33	0	F	F	T	T	26	NO
88035	232	920211	075122.26	60	63	0	0	0	0	F	F	T	T	26	NO
223	396	920211	100130.79	0	0	0	69	100	0	F	F	F	F	26	NO
88067	242	920211	173350.45	60	49	0	0	0	0	F	F	T	T	26	NO
88117	231	920211	075734.75	60	100	100	0	0	0	F	F	F	F	26	NO
88120	242	920211	173350.45	60	0	0	0	25	0	F	F	T	T	26	NO
88120	241	920211	173319.96	20	0	0	0	0	0	F	F	T	T	26	NO
152	396	920211	061207.43	0	0	0	69	100	0	F	F	F	F	26	NO
20827	399	920211	031835.67	0	0	0	69	100	0	F	F	F	F	26	NO
21376	396	920211	100402.07	0	0	0	69	100	0	F	F	F	F	26	NO
14086	241	920211	174117.68	60	100	99	0	0	0	F	F	F	F	26	NO
21011	369	920211	035325.95	100	0	0	20	40	0	F	F	F	F	26	NO
21659	232	920211	083904.72	100	20	0	0	17	0	F	F	T	T	26	NO
1959	232	920211	052011.96	0	0	0	69	100	0	F	F	F	F	26	NO
1347	399	920211	123854.69	0	0	0	69	100	0	F	F	F	F	26	NO
13878	241	920211	173159.75	60	100	100	0	0	0	F	F	F	F	26	NO
13878	241	920211	172857.63	60	100	89	15	0	0	F	F	F	F	26	NO
14086	241	920211	174913.11	60	100	99	0	0	0	F	F	F	F	26	NO
20308	383	920211	132010.39	0	0	0	69	100	0	F	F	F	F	26	NO
88083	222	920211	120844.16	40	71	57	0	33	0	F	F	T	T	26	NO
88111	241	920211	174117.68	60	52	0	31	100	0	F	F	F	F	26	NO
13815	233	920211	094258.77	0	0	0	69	100	0	F	F	F	F	26	NO
14086	241	920211	174354.95	60	100	99	0	0	0	F	F	F	F	26	NO
14131	232	920211	052128.54	0	0	0	69	100	0	F	F	F	F	26	NO
88737	241	920211	173616.76	40	30	0	0	33	0	F	F	T	T	26	NO
12283	221	920210	211850.51	0	0	0	69	100	0	F	F	F	F	26	NO
7842	399	920205	214705.85	0	0	0	69	100	0	F	F	F	F	26	NO
16214	221	920211	144012.71	60	99	99	0	0	0	F	F	F	F	26	NO

SAT	SNSR	DATE	TIME	OBS	U	V	W	W>10	ID	FH	HALO	AGE	σ	RANK	EXPERT
88848	399	920211	031524.51	40	0	0	0	33	0	F	F	T	T	26	NO
4881	242	920210	230244.97	60	94	0	0	25	0	F	F	T	F	26	NO
88884	398	920206	143035.10	40	0	0	0	0	0	F	F	T	T	26	NO
88879	232	920211	100911.49	20	51	0	0	50	0	F	F	T	T	26	NO
88888	242	920210	224923.21	60	0	0	0	0	0	F	F	T	T	26	NO
88868	241	920211	175728.50	60	0	0	0	25	0	F	F	T	T	26	NO
88868	242	920211	175709.66	20	0	0	0	0	0	F	F	T	T	26	NO
18272	396	920211	184303.83	0	0	0	69	100	0	F	F	F	F	26	NO
18606	398	920128	233002.62	0	0	0	69	100	0	F	F	F	F	26	NO
11353	243	920211	195321.20	60	37	20	0	0	0	F	F	T	T	26	NO
87371	232	920211	085601.02	.00	7[illegible]	0	16	29	0	F	F	T	T	26	NO
87346	329	920211	212117.31	40	95	99	38	67	0	T	F	F	F	26	NO
4942	399	920211	203747.63	0	52	57	8	0	100	F	F	F	F	26	NO
4881	242	920210	230559.01	60	94	0	0	0	0	F	F	T	F	26	NO
87353	232	920211	050842.67	40	13	0	23	33	0	F	F	T	T	26	NO
7162	242	920211	175401.07	0	20	0	69	100	0	F	F	F	F	25	NO
7210	232	920211	073938.33	20	9	0	59	100	0	F	F	F	F	25	NO
20557	233	920211	094223.80	0	60	0	69	100	0	F	F	F	F	25	NO
7443	395	920210	223448.82	100	74	0	18	20	0	F	F	F	F	25	NO
196	745	920115	003744.03	0	0	0	62	100	0	F	F	F	F	24	NO
166	398	920202	124852.63	0	0	0	62	100	0	F	F	F	F	24	NO
11145	241	920211	173159.75	60	100	88	0	0	0	F	F	F	F	24	NO
12947	398	920201	114549.92	0	0	0	62	100	0	F	F	F	F	24	NO
13073	390	920211	100024.22	0	0	0	62	100	0	F	F	F	F	24	NO
10365	242	920210	223052.30	60	3	0	41	75	0	F	F	F	F	24	NO
263	399	920211	053140.08	0	0	0	62	100	0	F	F	F	F	24	NO
10617	399	920211	101030.77	0	0	0	62	100	0	F	F	F	F	24	NO
5435	399	920211	011328.18	0	0	0	62	100	0	F	F	F	F	24	NO
4869	398	920210	093716.01	0	0	0	62	100	0	F	F	F	F	24	NO
5281	396	920211	205718.99	0	0	0	62	100	0	F	F	F	F	24	NO
15054	334	920211	123751.07	0	0	0	62	100	0	F	F	F	F	24	NO
14176	393	920211	191315.07	0	0	0	62	100	0	F	F	F	F	24	NO
20646	334	920211	052042.33	0	0	0	62	100	0	F	F	F	F	24	NO
21346	383	920211	131930.21	0	0	0	62	100	0	F	F	F	F	24	NO
19656	399	920211	101933.53	0	0	0	62	100	0	F	F	F	F	24	NO
19960	221	920210	211850.51	0	0	0	62	100	0	F	F	F	F	24	NO
1370	399	920211	025141.64	0	0	0	62	100	0	F	F	F	F	24	NO
21506	398	920131	234351.53	0	0	0	62	100	0	F	F	F	F	24	NO
10013	385	920211	090755.60	0	0	0	62	100	0	F	F	F	F	24	NO
9826	399	920211	063818.29	0	0	0	62	100	0	F	F	F	F	24	NO
19362	382	920211	035847.67	0	0	0	62	100	0	F	F	F	F	24	NO
18645	396	920211	074226.79	0	8	0	62	100	0	F	F	F	F	24	NO
10092	232	920211	073534.40	60	91	44	49	50	0	F	F	F	F	24	NO
19473	398	920208	050624.96	0	0	0	62	100	0	F	F	F	F	24	NO
87947	398	920210	045915.51	0	0	0	62	100	0	F	F	F	F	24	NO
87947	396	920211	195236.22	0	0	0	62	100	0	F	F	F	F	24	NO
16963	369	920211	050100.73	100	95	20	0	0	0	F	F	F	F	24	NO
18571	242	920210	232056.94	60	61	0	49	75	0	F	F	F	F	24	NO
7213	393	920211	191058.55	0	0	0	62	100	0	F	F	F	F	24	NO
979	393	920211	182608.23	0	0	0	62	100	0	F	F	F	F	24	NO
7959	399	920211	011415.85	0	0	0	62	100	0	F	F	F	F	24	NO
12102	231	920211	075734.75	0	20	0	62	100	0	F	F	F	F	23	NO
88108	242	920210	224108.97	60	88	0	34	75	0	F	F	F	F	23	NO
87711	232	920211	092159.30	0	20	0	62	100	0	F	F	F	F	23	NO
88033	241	920211	173019.24	80	0	0	0	20	0	F	F	T	F	23	NO
7088	329	920211	193756.79	0	0	0	92	100	0	T	F	F	F	23	NO
8314	329	920211	001602.91	0	0	0	92	100	0	T	F	F	F	23	NO
4664	395	920213	131155.08	0	72	0	62	100	0	F	F	F	F	23	NO
18997	242	920211	175641.24	20	62	0	56	100	0	F	F	F	F	23	NO
13554	242	920211	174250.79	100	1	0	18	11	0	F	F	F	F	23	NO
18985	385	920124	052920.50	0	92	0	54	100	0	F	F	F	F	23	NO
6085	329	920211	003625.65	0	0	0	92	100	0	T	F	F	F	23	NO
14086	241	920211	173159.75	60	100	82	0	0	0	F	F	F	F	23	NO
3093	329	920211	083930.42	0	0	0	92	100	0	T	F	F	F	23	NO

SAT	SNSR	DATE	TIME	OBS	U	V	W	W>10	ID	FH	HALO	AGE	σ	RANK	EXPERT
9416	242	920210	224446.40	60	0	0	36	75	0	F	F	F	F	23	NO
14783	242	920210	224446.40	60	76	0	43	75	0	F	F	F	F	23	NO
17116	399	920211	080611.17	0	40	0	62	100	0	F	F	F	F	22	NO
87346	398	920210	094148.35	0	0	0	54	100	0	F	F	F	F	22	NO
4231	393	920211	064713.93	0	0	0	54	100	0	F	F	F	F	22	NO
13177	243	920211	195345.85	40	100	100	0	0	0	F	F	F	F	22	NO
9799	396	920119	123453.02	0	0	0	54	100	0	F	F	F	F	22	NO
10718	399	920211	223435.15	0	0	0	54	100	0	F	F	F	F	22	NO
12879	395	920211	131155.08	0	80	60	38	100	0	F	F	F	F	22	NO
1312	399	920211	015337.55	0	0	0	54	100	0	F	F	F	F	22	NO
11145	241	920211	172857.63	60	100	75	2	0	0	F	F	F	F	22	NO
12322	221	920210	195115.32	20	92	67	59	100	0	F	F	F	T	22	NO
14086	241	920211	172857.63	40	100	99	0	0	0	F	F	F	F	22	NO
13515	222	920210	201818.77	0	0	0	54	100	0	F	F	F	F	22	NO
12564	404	920210	192500.81	100	0	0	0	29	0	F	F	F	F	22	NO
17872	242	920210	224446.40	60	40	0	42	75	0	F	F	F	F	22	NO
5498	242	920211	175001.63	20	15	0	48	100	0	F	F	F	F	22	NO
15679	242	920211	175001.63	100	20	0	0	31	0	F	F	F	F	22	NO
4193	399	920211	011415.85	0	0	0	54	100	0	F	F	F	F	22	NO
2367	398	920206	143035.10	0	0	0	54	100	0	F	F	F	F	22	NO
5322	399	920210	235311.41	0	0	0	54	100	0	F	F	F	F	22	NO
3843	399	920211	085915.18	0	0	0	54	100	0	F	F	F	F	22	NO
1778	398	920127	005053.62	0	0	0	54	100	0	F	F	F	F	22	NO
21848	398	920209	095244.27	0	0	0	54	100	0	F	F	F	F	22	NO
3794	396	920211	100004.44	0	60	0	62	100	0	F	F	F	F	22	NO
3749	398	920131	052028.33	0	0	0	54	100	0	F	F	F	F	22	NO
15783	396	920211	100130.79	0	0	0	54	100	0	F	F	F	F	22	NO
16209	232	920211	052102.97	20	86	91	37	50	0	F	F	F	F	22	NO
15935	398	920210	094148.35	0	0	0	54	100	0	F	F	F	F	22	NO
8402	383	920211	131900.09	0	0	0	54	100	0	F	F	F	F	22	NO
21870	329	920211	153245.25	0	40	0	92	100	0	T	F	F	F	22	NO
21150	399	920211	011328.18	0	0	0	54	100	0	F	F	F	F	22	NO
7074	221	920211	141832.10	0	0	0	54	100	0	F	F	F	F	22	NO
20055	232	920211	053635.68	0	0	0	54	100	0	F	F	F	F	22	NO
19853	232	920211	073534.40	0	0	0	54	100	0	F	F	F	F	22	NO
2361	242	920211	175147.94	0	0	0	46	100	0	F	F	F	F	21	NO
19169	404	920211	041616.34	0	0	0	46	100	0	F	F	F	F	21	NO
13666	369	920211	042832.11	0	0	0	46	100	0	F	F	F	F	21	NO
235	393	920211	220213.80	0	0	0	46	100	0	F	F	F	F	21	NO
14715	232	920211	073534.40	0	0	0	46	100	0	F	F	F	F	21	NO
14086	241	920211	175728.50	60	99	75	0	0	0	F	F	F	F	21	NO
14086	242	920211	173356.45	60	99	76	0	0	0	F	F	F	F	21	NO
14034	369	920211	030543.80	100	0	0	0	0	0	F	F	F	F	21	NO
15340	232	920211	082926.77	0	0	0	46	100	0	F	F	F	F	21	NO
16968	369	920211	050100.73	100	70	0	0	0	0	F	F	F	F	21	NO
18965	232	920211	073327.14	0	0	0	46	100	0	F	F	F	F	21	NO
14086	241	920211	173616.76	60	99	76	0	0	0	F	F	F	F	21	NO
4330	399	920211	031423.87	0	0	0	46	100	0	F	F	F	F	21	NO
21444	398	920209	115754.19	0	0	0	46	100	0	F	F	F	F	21	NO
21499	399	920211	113507.79	0	0	0	46	100	0	F	F	F	F	21	NO
18591	399	920211	100951.00	0	0	0	46	100	0	F	F	F	F	21	NO
13554	242	920211	175001.63	100	2	0	0	0	0	F	F	F	F	21	NO
14086	242	920211	173743.47	60	99	76	0	0	0	F	F	F	F	21	NO
14086	242	920211	174036.02	60	99	76	0	0	0	F	F	F	F	21	NO
5761	399	920203	220536.66	0	0	0	46	100	0	F	F	F	F	21	NO
8745	232	920211	085601.02	0	0	0	46	100	0	F	F	F	F	21	NO
3974	395	920211	131155.08	0	0	0	46	100	0	F	F	F	F	21	NO
19560	398	920209	151846.06	0	0	0	46	100	0	F	F	F	F	21	NO
6681	398	920206	095345.03	0	0	0	46	100	0	F	F	F	F	21	NO
21404	232	920211	051429.24	0	0	0	46	100	0	F	F	F	F	21	NO
21115	232	920211	084013.83	60	48	0	52	100	0	F	F	F	T	21	NO
7035	222	920210	200639.51	20	0	0	38	100	0	F	F	F	F	21	NO
20465	399	920211	080517.12	0	0	0	46	100	0	F	F	F	F	21	NO
20833	383	920211	201906.84	0	0	0	46	100	0	F	F	F	F	21	NO

SAT	SNSR	DATE	TIME	OBS	U	V	W	W>10	ID	FH	HALO	AGE	σ	RANK	EXPERT
21185	232	920211	073846.40	20	85	90	37	50	0	F	F	F	F	21	NO
21011	369	920211	050100.73	100	0	0	0	0	0	F	F	F	F	21	NO
21223	383	920128	114546.87	0	0	0	0	0	100	F	F	F	F	21	NO
3825	232	920211	091818.53	0	76	0	54	100	0	F	F	F	F	21	NO
21011	369	920211	022437.88	100	0	0	0	0	0	F	F	F	F	21	NO
21011	369	920211	030327.21	100	0	0	0	0	0	F	F	F	F	21	NO
967	384	920207	161921.30	0	0	0	46	100	0	F	F	F	F	21	NO
21872	329	920211	153245.25	0	72	0	85	100	0	T	F	F	F	21	NO
10183	398	920126	232902.17	0	0	0	46	100	0	F	F	F	F	21	NO
11145	241	920211	174354.95	60	100	75	0	0	0	F	F	F	F	21	NO
11145	241	920211	174633.88	60	100	74	0	0	0	F	F	F	F	21	NO
11145	241	920211	174913.13	60	100	74	0	0	0	F	F	F	F	21	NO
11145	241	920211	174117.68	60	100	74	0	0	0	F	F	F	F	21	NO
88111	242	920211	174250.79	100	60	0	0	0	0	F	F	F	F	21	NO
88119	334	920211	131922.29	40	21	40	0	0	0	F	F	T	F	21	NO
87383	399	920211	113747.66	0	0	0	46	100	0	F	F	F	F	21	NO
87394	399	920211	143508.67	0	0	0	46	100	0	F	F	F	F	21	NO
12897	404	920210	192609.43	100	51	0	0	13	0	F	F	F	F	21	NO
88111	242	920211	175001.63	100	59	0	0	0	0	F	F	F	F	21	NO
5281	398	920209	072430.52	0	0	0	46	100	0	F	F	F	F	21	NO
5076	398	920209	151846.06	0	0	0	46	100	0	F	F	F	F	21	NO
21869	329	920211	153245.25	0	16	0	85	100	0	T	F	F	F	20	NO
5349	329	920211	083930.42	0	0	0	85	100	0	T	F	F	F	20	NO
88111	242	920211	173743.47	60	59	0	36	75	0	F	F	F	F	20	NO
4647	241	920211	172952.42	20	95	80	40	50	[illegible]	F	F	F	F	20	NO
17719	232	920211	051401.39	0	68	0	54	100	[illegible]	F	F	F	F	20	NO
5498	242	920211	175257.00	0	52	0	54	100	0	F	F	F	F	20	NO
87346	329	920211	064807.63	0	72	90	38	100	0	T	F	F	F	20	NO
12864	329	920211	064807.63	0	0	0	85	100	0	T	F	F	F	20	NO
10454	329	920211	075245.98	0	0	0	85	100	0	T	F	F	F	20	NO
22	329	920211	000827.75	0	0	0	85	100	0	T	F	F	F	20	NO
21538	745	920125	150400.32	0	4	0	0	0	100	F	F	F	F	20	NO
20581	329	920211	153245.25	0	20	0	85	100	0	T	F	F	F	20	NO
21438	329	920211	195137.60	0	0	0	85	100	0	T	F	F	F	20	NO
21871	329	920211	153245.25	0	52	0	85	100	0	T	F	F	F	20	NO
1271	393	920211	224415.30	0	36	0	54	100	0	F	F	F	F	20	NO
87398	232	920211	050842.67	20	66	88	0	50	0	F	F	T	F	19	NO
11718	398	920119	171545.10	100	55	0	95	100	100	F	F	T	T	19	NO
10365	242	920210	230640.35	80	84	0	0	40	0	F	F	F	F	19	NO
4642	242	920210	225040.46	20	92	83	32	50	0	F	F	F	F	19	NO
18589	232	920211	073221.36	0	0	0	38	100	0	F	F	F	F	19	NO
21341	398	920131	233930.20	0	76	0	46	100	0	F	F	F	F	19	NO
4384	393	920211	191140.42	0	0	0	38	100	0	F	F	F	F	19	NO
4421	383	920211	144256.24	0	0	0	38	100	0	F	F	F	F	19	NO
12257	398	920131	192428.77	0	88	0	38	100	0	F	F	F	F	19	NO
4382	396	920210	235934.85	0	0	0	38	100	0	F	F	F	F	19	NO
87309	399	920209	210835.47	0	0	0	38	100	0	F	F	F	F	19	NO
87207	232	920211	073534.40	0	0	0	38	100	0	F	F	F	F	19	NO
1272	393	920211	220213.80	0	0	0	38	100	0	F	F	F	F	19	NO
3748	232	920211	095328.07	40	88	0	50	67	0	F	F	F	F	19	NO
14693	398	920131	052028.33	0	0	0	38	100	0	F	F	F	F	19	NO
3938	399	920211	080733.76	0	0	0	38	100	0	F	F	F	F	19	NO
2702	398	920210	094148.35	0	0	0	38	100	0	F	F	F	F	19	NO
20262	398	920128	233141.60	0	0	0	38	100	0	F	F	F	F	19	NO
3462	232	920211	074001.84	0	0	0	38	100	0	F	F	F	F	19	NO
14503	385	920211	090537.90	0	0	0	38	100	0	F	F	F	F	19	NO
3555	396	920122	023456.12	0	0	0	38	100	0	F	F	F	F	19	NO
6843	398	920208	120547.77	0	0	0	38	100	0	F	F	F	F	19	NO
4964	395	920210	223456.82	0	0	0	38	100	0	F	F	F	F	19	NO
14694	399	920211	220612.01	0	0	0	38	100	0	F	F	F	F	19	NO
9681	393	920211	064713.93	0	0	0	38	100	0	F	F	F	F	19	NO
2777	398	920208	120646.15	0	0	0	38	100	0	F	F	F	F	19	NO
8462	232	920211	053816.92	80	93	20	0	0	0	F	F	F	F	19	NO
13905	399	920211	133825.31	0	0	0	38	100	0	F	F	F	F	19	NO

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21594	398	920208	215615.65	0	0	0	31	100	0	F	F	F	F	18	NO
2177	399	920210	205651.27	0	0	0	31	100	0	F	F	F	F	18	NO
12294	393	920211	064713.93	0	0	0	31	100	0	F	F	F	F	18	NO
21872	393	920211	105114.03	0	0	0	31	100	0	F	F	F	F	18	NO
21871	393	920211	105114.03	0	0	0	31	100	0	F	F	F	F	18	NO
10760	399	920211	171158.80	0	0	0	31	100	0	F	F	F	F	18	NO
7076	393	920211	191017.87	0	0	0	31	100	0	F	F	F	F	18	NO
88067	241	920211	173345.84	0	0	0	31	100	0	F	F	F	F	18	NO
5531	393	920211	220345.70	0	0	0	31	100	0	F	F	F	F	18	NO
5417	398	920210	094148.35	0	0	0	31	100	0	F	F	F	F	18	NO
5763	399	920211	113545.63	0	0	0	31	100	0	F	F	F	F	18	NO
21087	399	920211	004827.72	0	84	3	38	100	0	F	F	F	F	18	NO
15157	398	920206	142740.82	0	0	0	31	100	0	F	F	F	F	18	NO
20581	393	920211	105114.03	0	0	0	31	100	0	F	F	F	F	18	NO
13878	241	920211	174633.88	40	100	80	0	0	0	F	F	F	F	18	NO
3912	396	920211	195226.35	0	0	0	31	100	0	F	F	F	F	18	NO
649	399	920211	050733.42	0	0	0	31	100	0	F	F	F	F	18	NO
17123	398	920115	235247.13	0	0	0	31	100	0	F	F	F	F	18	NO
18471	329	920211	000514.37	0	0	0	77	100	0	T	F	F	F	18	NO
21691	329	920211	043739.26	0	0	0	77	100	0	T	F	F	F	18	NO
21447	221	920210	201942.02	0	0	0	31	100	0	F	F	F	F	18	NO
447	329	920211	122649.15	0	0	0	77	100	0	T	F	F	F	18	NO
17141	393	920211	191017.87	0	0	0	31	100	0	F	F	F	F	18	NO
16390	396	920211	061217.30	0	0	0	31	100	0	F	F	F	F	18	NO
13814	231	920211	103954.72	0	0	0	31	100	0	F	F	F	F	18	NO
15027	404	920211	041331.80	80	0	0	0	40	0	F	F	F	F	18	NO
20510	399	920211	011134.04	0	0	0	31	100	0	F	F	F	F	18	NO
13878	241	920211	174913.11	40	100	79	0	0	0	F	F	F	F	18	NO
13904	243	920211	135826.02	0	0	0	31	100	0	F	F	F	F	18	NO
6278	242	920210	223358.66	60	99	0	41	75	0	F	F	F	T	17	NO
14195	231	920211	103954.72	80	62	0	0	40	0	F	F	F	F	17	NO
10579	232	920211	084751.73	60	84	0	34	75	0	F	F	F	T	17	NO
20662	951	920211	085933.98	60	91	53	0	0	0	F	F	F	F	17	NO
21011	369	920211	023208.99	80	0	0	0	0	0	F	F	F	F	16	NO
21011	369	920211	030916.93	80	0	0	0	0	0	F	F	F	F	16	NO
8084	329	920211	193756.79	0	0	0	69	100	0	T	F	F	F	16	NO
12770	329	920211	081032.68	0	0	0	69	100	0	T	F	F	F	16	NO
20624	329	920211	153935.33	0	0	0	69	100	0	T	F	F	F	16	NO
9819	329	920211	225736.68	0	0	0	69	100	0	T	F	F	F	16	NO
3174	221	920211	144012.71	60	0	0	12	50	0	F	F	F	F	16	NO
14034	369	920211	030910.93	80	0	0	0	0	0	F	F	F	F	16	NO
13878	242	920211	175001.63	0	96	97	0	0	0	F	F	F	F	16	NO
10447	232	920211	092134.88	20	90	88	11	0	0	F	F	F	F	16	NO
4881	242	920210	223052.30	20	32	0	0	0	0	F	F	T	F	16	NO
5010	393	920211	224607.33	0	0	97	15	0	0	F	F	F	F	16	NO
5015	329	920211	122649.15	0	0	0	69	100	0	T	F	F	F	16	NO
4744	221	920210	202051.21	0	60	0	38	100	0	F	F	F	F	16	NO
6085	232	920211	060132.72	20	96	87	6	0	0	F	F	F	F	16	NO
7079	329	920117	033604.77	0	0	0	69	100	0	T	F	F	F	16	NO
3749	329	920211	040254.32	0	0	0	69	100	0	T	F	F	F	16	NO
12897	242	920210	223052.30	60	99	28	0	0	0	F	F	F	F	15	NO
12897	242	920210	223358.66	60	99	28	0	0	0	F	F	F	F	15	NO
5581	232	920211	073057.02	40	92	11	36	67	0	F	F	F	F	15	NO
12212	231	920211	124108.50	0	24	20	31	100	0	F	F	F	F	15	NO
20962	242	920210	224923.21	60	0	0	3	50	0	F	F	F	F	15	NO
11080	232	920211	095328.07	0	28	0	31	100	0	F	F	F	F	15	NO
19105	242	920211	174459.73	20	86	79	26	50	0	F	F	F	F	15	NO
13554	242	620210	225040.46	0	0	0	15	0	0	F	T	F	F	14	NO
1843	329	920211	212305.36	0	0	0	62	100	0	T	F	F	F	14	NO
13177	243	920211	195321.20	0	96	87	0	0	0	F	F	F	F	14	NO
13554	242	920210	225302.73	60	0	0	15	0	0	F	F	F	F	14	NO
14086	243	920211	195321.20	60	95	12	0	0	0	F	F	F	F	14	NO
4969	329	920211	081128.50	0	0	0	62	100	0	T	F	F	F	14	NO
4237	329	920211	035432.62	0	0	0	62	100	0	T	F	F	F	14	NO

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6278	242	920210	223052.30	60	99	1	0	0	0	F	F	F	F	14	NO
11708	242	920210	232056.94	60	98	12	0	0	0	F	F	F	F	14	NO
88108	242	920210	232656.94	60	94	0	0	0	0	F	F	F	F	14	NO
14086	242	920210	230559.01	60	97	4	0	0	0	F	F	F	F	14	NO
14086	242	920210	230912.44	60	97	4	0	0	0	F	F	F	F	14	NO
21872	329	920211	170643.38	0	72	37	62	100	0	T	F	F	F	14	NO
14086	242	920210	224446.40	60	96	1	0	0	0	F	F	F	F	14	NO
14086	242	920210	225947.88	60	96	5	0	0	0	F	F	F	F	14	NO
14086	242	920210	230244.97	60	96	3	0	0	0	F	F	F	F	14	NO
3784	329	920211	153935.33	0	0	0	62	100	0	T	F	F	F	14	NO
14555	329	920211	194610.19	0	0	0	62	100	0	T	F	F	F	14	NO
2639	232	920211	084013.83	60	85	42	0	0	0	F	F	F	F	14	NO
10723	221	920211	144012.71	60	99	0	0	25	0	F	F	F	F	14	NO
1377	329	920211	081032.68	0	0	0	62	100	0	T	F	F	F	14	NO
20717	383	920211	025439.64	60	83	45	0	25	0	F	F	F	F	14	NO
14501	329	920211	000514.37	0	0	0	62	100	0	T	F	F	F	14	NO
16497	221	920211	144012.71	60	86	13	0	0	0	F	F	F	F	13	NO
21871	329	920211	170643.38	0	72	0	62	100	0	T	F	F	F	13	NO
21471	396	920211	041222.66	20	0	0	43	50	0	F	F	F	F	13	NO
16533	232	920211	091049.88	60	74	37	0	0	0	F	F	F	F	13	NO
87394	399	920211	094657.86	20	87	0	9	0	0	F	F	T	F	13	NO
6976	233	920211	094223.80	60	0	0	0	25	0	F	F	F	F	13	NO
14783	242	920210	223733.02	60	85	0	0	0	0	F	F	F	F	13	NO
11622	242	920210	225302.73	60	91	0	0	0	0	F	F	F	F	13	NO
2639	232	920211	083818.91	60	84	38	0	25	0	F	F	F	F	13	NO
21552	241	920211	172857.63	60	0	0	0	25	0	F	F	F	F	13	NO
13269	951	920211	085933.98	60	89	9	0	0	0	F	F	F	F	13	NO
21429	232	920211	052307.17	60	91	0	0	0	0	F	F	F	F	13	NO
15246	241	920211	175728.50	60	0	0	0	25	0	F	F	F	F	13	NO
738	242	920210	225629.64	40	0	0	3	67	0	F	F	F	F	13	NO
88033	242	920211	173350.45	20	0	0	0	0	0	F	F	T	F	13	NO
10365	242	920210	230244.97	60	85	0	0	0	0	F	F	F	F	13	NO
11622	242	920210	224923.21	60	91	0	0	0	0	F	F	F	F	13	NO
10246	232	920211	073057.02	20	80	81	0	0	0	F	F	F	F	13	NO
9852	242	920210	225629.64	60	0	0	0	0	0	F	F	F	F	12	NO
7273	396	920211	074226.79	40	0	0	22	33	0	F	F	F	F	12	NO
2222	232	920211	083818.91	60	82	0	0	0	0	F	F	F	F	12	NO
20581	329	920211	170043.38	0	36	0	62	100	0	T	F	F	F	12	NO
13554	241	920211	174354.95	60	13	0	0	0	0	F	F	F	F	12	NO
13554	241	920211	174633.88	60	13	0	0	0	0	F	F	F	F	12	NO
20962	242	920210	225302.73	60	0	0	0	0	0	F	F	F	F	12	NO
15935	329	920211	193756.79	0	0	0	54	100	0	T	F	F	F	12	NO
17239	232	920211	052307.17	0	76	87	0	0	0	F	F	F	F	12	NO
13554	241	920211	172857.63	60	13	0	0	0	0	F	F	F	F	12	NO
20669	399	920211	031608.99	40	0	51	0	0	0	F	F	F	F	12	NO
14240	232	920211	053905.00	0	84	83	0	0	0	F	F	F	F	12	NO
12166	329	920211	043719.26	0	0	0	54	100	0	T	F	F	F	12	NO
15246	242	920211	175641.24	60	0	0	0	0	0	F	F	F	F	12	NO
13554	241	920211	174117.68	60	13	0	0	0	0	F	F	F	F	12	NO
13554	241	920211	173159.75	60	7	0	0	0	0	F	F	F	F	12	NO
21870	329	920211	170643.38	0	60	0	62	100	0	T	F	F	F	12	NO
15767	396	920211	061147.69	60	79	0	5	0	0	F	F	F	F	12	NO
13554	241	920211	175728.50	60	1	0	0	0	0	F	F	F	F	12	NO
10365	242	920210	223358.66	60	3	0	0	0	0	F	F	F	F	12	NO
4881	242	920210	225947.88	60	94	0	43	75	0	F	F	T	T	12	NO
13554	241	920211	174913.11	60	13	0	0	0	0	F	F	F	F	12	NO
11622	242	920210	223052.30	60	0	0	0	0	0	F	F	F	F	12	NO
11690	232	920211	092047.21	60	0	0	0	0	0	F	F	F	F	12	NO
12388	329	920211	145431.02	0	0	0	54	100	0	T	F	F	F	12	NO
4515	396	920211	061147.69	60	50	24	7	50	0	F	F	F	F	11	NO
19541	232	920211	084751.73	60	59	0	0	0	0	F	F	F	F	11	NO
12120	242	920210	225629.64	60	19	0	0	0	0	F	F	F	F	11	NO
12993	232	920211	083244.24	60	59	0	6	25	0	F	F	F	F	11	NO
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11622	242	920210	230559.01	60	70	0	0	0	0	F	F	F	F	11	NO
6779	398	920207	072808.50	80	35	32	0	20	0	F	F	T	F	11	NO
11622	242	920210	230912.44	60	70	0	0	0	0	F	F	F	F	11	NO
3292	232	920211	083818.91	60	50	0	0	0	0	F	F	F	F	11	NO
1716	222	920210	201818.77	0	40	77	23	0	0	F	F	F	F	11	NO
13554	242	920210	230244.97	60	16	0	0	0	0	F	F	F	F	11	NO
17670	399	920210	205651.27	20	0	0	27	50	0	F	F	F	F	11	NO
13554	242	920210	232656.94	60	15	0	0	0	0	F	F	F	F	11	NO
15679	241	920211	175728.50	60	22	0	0	0	0	F	F	F	F	11	NO
11622	242	920210	230244.97	60	69	0	0	0	0	F	F	F	F	11	NO
13554	242	920210	230912.44	60	15	0	0	0	0	F	F	F	F	11	NO
13554	242	920210	230559.01	60	15	0	0	0	0	F	F	F	F	11	NO
11145	242	920210	223052.30	60	59	0	0	0	0	F	F	F	F	11	NO
11145	242	920210	223358.66	60	59	0	0	0	0	F	F	F	F	11	NO
10453	396	920211	182408.83	20	0	0	29	50	0	F	F	F	F	11	NO
14783	242	920210	225302.73	60	46	0	0	0	0	F	F	F	F	11	NO
16396	242	920210	223052.30	60	42	0	0	0	0	F	F	F	F	11	NO
88111	241	920211	172857.63	60	52	0	0	0	0	F	F	F	F	11	NO
88111	242	920211	174036.02	60	60	0	0	0	0	F	F	F	F	11	NO
88111	242	920210	224108.97	60	37	0	0	0	0	F	F	F	F	11	NO
11622	242	920210	225947.88	60	69	0	0	0	0	F	F	F	F	11	NO
13554	243	920211	195321.20	60	48	0	0	0	0	F	F	F	F	11	NO
88111	241	920211	175726.50	60	60	0	0	0	0	F	F	F	F	11	NO
19993	329	920211	035432.62	0	0	0	46	100	0	T	F	F	F	11	NO
20258	232	920211	084459.95	60	24	0	0	0	0	F	F	F	F	11	NO
10541	396	920211	061207.43	20	62	0	65	100	0	F	F	F	T	11	NO
88111	241	920211	173159.75	60	56	0	0	0	0	F	F	F	F	11	NO
13177	242	920210	225629.64	40	93	0	0	0	0	F	F	F	F	10	NO
21835	396	920211	061450.98	20	96	28	24	0	0	F	F	F	F	10	NO
14591	242	920210	223358.66	40	0	0	0	33	0	F	F	F	F	10	NO
14086	242	920210	232721.32	40	97	6	2	0	0	F	F	F	F	10	NO
21869	329	920211	170643.38	0	32	0	54	100	0	T	F	F	F	10	NO
13648	232	920211	091202.36	0	68	80	0	0	0	F	F	F	F	10	NO
17128	231	920211	064928.93	20	97	60	8	50	0	F	F	F	F	10	NO
13554	242	920210	224923.21	40	0	0	15	0	0	F	F	F	F	10	NO
11269	396	920211	020456.34	40	0	0	0	0	0	F	F	F	F	9	NO
15916	242	920211	173743.47	40	0	0	0	0	0	F	F	F	F	9	NO
14524	399	920211	110935.35	40	85	52	0	33	0	F	F	F	F	9	NO
17000	241	920211	172952.42	20	17	0	36	50	0	F	F	F	F	9	NO
15935	329	920211	064807.63	0	0	0	38	100	0	T	F	F	F	9	NO
7324	242	920210	224954.97	40	87	0	0	0	0	F	F	F	F	9	NO
18549	221	920210	211939.45	0	24	77	0	0	0	F	F	F	F	9	NO
21390	329	920211	193756.79	0	0	0	38	100	0	T	F	F	F	9	NO
11765	329	920211	032423.85	0	0	0	38	100	0	T	F	F	F	9	NO
17333	232	920211	093927.84	40	0	0	0	0	0	F	F	F	F	9	NO
20674	388	920211	072931.29	40	0	0	0	0	0	F	F	F	F	9	NO
3569	232	920211	075205.23	20	33	48	48	50	0	[illegible]	F	F	F	9	NO
10882	329	920211	075245.98	0	0	0	31	100	0	T	F	F	F	8	NO
13738	329	920211	121911.27	0	0	0	31	100	0	T	F	F	F	8	NO
20559	222	920210	200459.89	20	0	0	0	50	0	F	F	F	F	8	NO
15916	241	920211	173725.84	20	0	0	0	50	0	F	F	F	F	8	NO
20704	232	920211	090056.60	20	0	0	0	50	0	F	F	F	F	8	NO
20258	232	920211	085524.11	60	88	0	0	0	0	F	F	F	T	8	NO
14528	383	920211	131850.04	20	0	0	3	50	0	F	F	F	F	8	NO
8593	329	920211	201916.29	0	0	0	31	100	0	T	F	F	F	8	NO
5760	329	920211	040413.99	0	72	10	46	100	0	T	F	F	F	8	NO
4862	329	920211	081128.50	0	0	0	31	100	0	T	F	F	F	8	NO
15530	396	920211	035934.63	40	71	0	0	0	0	F	F	F	F	8	NO
20082	232	920211	083330.45	20	99	0	0	0	0	F	F	F	F	8	NO
17665	396	920211	041232.53	40	53	0	25	33	0	F	F	F	F	8	NO
3555	329	920211	003102.63	0	0	0	31	100	0	T	F	F	F	8	NO
15836	399	920211	055820.39	20	0	0	0	50	0	F	F	F	F	8	NO
1589	241	920211	174633.88	40	85	11	9	33	0	F	F	F	F	8	NO

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750	242	920210	230244.97	20	82	0	36	50	0	F	F	F	F	8	NO
10614	329	920211	000514.37	0	0	0	31	100	0	T	F	F	F	8	NO
20262	396	920211	205718.99	20	0	0	0	50	0	F	F	F	F	8	NO
81061	396	920211	065634.61	20	0	0	0	50	0	F	F	F	F	8	NO
10569	232	920211	073534.40	20	0	0	0	50	0	F	F	F	F	8	NO
14410	396	920211	095954.57	20	15	0	10	50	0	F	F	F	F	7	NO
12295	399	920211	112917.85	20	0	0	0	0	0	F	F	F	F	7	NO
14131	232	920211	052037.05	20	45	55	0	0	0	F	F	F	F	7	NO
17333	233	920211	094223.80	20	0	0	0	0	0	F	F	F	F	7	NO
14512	232	920211	094315.63	0	0	0	23	0	0	F	F	F	F	7	NO
13904	243	920211	185858.68	20	92	0	0	0	0	F	F	F	F	7	NO
88057	398	920206	150321.55	0	0	0	23	0	0	F	F	F	F	7	NO
16987	242	920211	175917.69	20	91	50	5	50	0	F	F	F	F	7	NO
87390	399	920211	153334.38	0	0	0	23	0	0	F	F	F	F	7	NO
87383	385	920211	113638.86	20	0	0	0	0	0	F	F	F	F	7	NO
88066	398	920122	075031.28	0	76	57	15	0	0	F	F	F	F	7	NO
88895	243	920211	185858.68	40	97	75	0	0	0	F	F	F	T	7	NO
12347	396	920211	205718.99	0	0	0	23	0	0	F	F	F	F	7	NO
14913	396	920211	205758.46	0	0	0	23	0	0	F	F	F	F	7	NO
1808	390	920211	061511.19	0	0	0	23	0	0	F	F	F	F	7	NO
1583	393	920211	145023.30	0	0	0	23	0	0	F	F	F	F	7	NO
20131	396	920116	052633.12	0	0	0	23	0	0	F	F	F	F	7	NO
10[illegible]12	399	920211	135429.55	0	0	0	23	0	0	F	F	F	F	7	NO
21390	232	620211	052356.69	0	0	0	23	0	0	F	F	F	F	7	NO
229	398	920208	094403.72	0	0	0	23	0	0	F	F	F	F	7	NO
20572	399	920211	000143.45	0	0	0	23	0	0	F	F	F		7	NO
19948	399	920211	223435.15	0	0	0	23	0	0	F	F	F		7	NO
21623	385	920211	090427.59	20	6	31	0	50	0	F	F	F	F	7	NO
21859	241	920211	174443.66	20	47	0	40	50	0	F	F	F	F	7	NO
2976	396	920211	035954.40	0	0	0	23	0	0	F	F	F	F	7	NO
1613	398	920207	072845.71	0	0	0	23	0	0	F	F	F	F	7	NO
21181	232	920211	065941.67	60	41	0	43	75	0	F	F	F	T	7	NO
21869	395	920211	105114.03	0	0	0	23	0	0	F	F	F	F	7	NO
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3553	396	920211	195236.22	0	0	0	23	0	0	F	F	F	F	7	NO
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17359	396	920211	194036.11	0	0	0	23	0	0	F	F	F	F	7	NO
10960	393	920211	191146.42	0	0	0	23	0	0	F	F	F	F	7	NO
19380	232	920211	083818.91	40	37	0	0	0	0	F	F	F	F	7	NO
20578	398	920206	095138.79	0	96	0	15	0	0	F	F	F	F	7	NO
3811	393	920211	191315.07	0	0	0	23	0	0	F	F	F	F	7	NO
9503	242	920210	224446.40	20	97	0	0	0	0	F	F	F	F	7	NO
9795	396	920211	033904.59	0	0	0	23	0	0	F	F	F	F	7	NO
6828	232	920211	073559.85	20	0	0	0	0	0	F	F	F	F	7	NO
4231	232	920211	065701.25	0	0	47	0	0	0	F	F	F	F	7	NO
4820	399	920211	171425.97	0	0	0	23	0	0	F	F	F	F	7	NO
12720	396	920211	061147.69	0	0	0	23	0	0	F	F	F	F	7	NO
15529	396	920211	035934.63	40	38	0	0	0	0	F	F	F	F	7	NO
12333	222	920210	200639.51	0	0	0	23	0	0	F	F	F	F	7	NO
21870	393	920211	105114.03	0	0	0	23	0	0	F	F	F	F	7	NO
10346	399	920211	124642.45	0	0	0	23	0	0	F	F	F	F	7	NO
10212	399	920211	154334.42	0	0	0	23	0	0	F	F	F	F	7	NO
11622	242	920210	223733.02	40	56	0	0	0	0	F	F	F	F	7	NO
12295	369	920211	200107.59	20	0	0	0	0	0	F	F	F	F	7	NO
15392	385	920211	113658.87	0	0	0	23	0	0	F	F	F	F	7	NO
10198	242	920211	175847.64	0	0	0	23	0	0	F	F	F	F	7	NO
21678	399	920211	111637.67	0	0	0	23	0	0	F	F	F	F	7	NO
21819	232	920211	100911.49	0	0	0	8	0	0	F	F	F	F	6	NO
18565	382	920211	113026.17	0	0	0	15	0	0	F	F	F	F	6	NO
19318	396	920211	033025.09	0	0	0	8	0	0	F	F	F	F	6	NO
21839	222	920210	200554.17	0	0	0	15	0	0	F	F	F	F	6	NO
19437	329	920211	225736.68	0	36	0	38	100	0	T	F	F	F	6	NO

SAT	SNSR	DATE	TIME	OBS	U	V	W	W>10	ID	FH	HALO	AGE	σ	RANK	EXPERT
12731	396	920211	194036.11	0	0	0	15	0	0	F	F	F	F	6	NO
13878	242	920211	175006.70	0	100	0	0	0	0	F	F	F	F	6	NO
3432	232	920211	091752.36	20	83	0	0	0	0	F	F	F	F	6	NO
3932	396	920211	064931.36	0	0	0	15	0	0	F	F	F	F	6	NO
13878	242	920211	174354.95	0	100	0	0	0	0	F	F	F	F	6	NO
1806	396	920211	064921.49	20	6	0	0	0	0	F	F	F	F	6	NO
20586	231	920211	075840.02	40	60	0	0	33	0	F	F	F	F	6	NO
18415	396	920211	122444.75	20	53	54	0	0	0	F	F	F	F	6	NO
3343	399	920211	111646.93	0	0	0	15	0	0	F	F	F	F	6	NO
21834	398	920210	093716.01	20	67	0	18	0	0	F	F	F	F	6	NO
21152	398	920205	130558.03	0	0	0	8	0	0	F	F	F	F	6	NO
20775	393	920211	183000.53	0	0	0	8	0	0	F	F	F	F	6	NO
12054	398	920115	235238.80	0	0	0	15	0	0	F	F	F	F	6	NO
11708	242	920210	223356.66	40	44	0	3	33	0	F	F	F	F	6	NO
20261	393	920211	182730.53	0	0	0	15	0	0	F	F	F	F	6	NO
10626	398	920128	233141.60	0	0	0	8	0	0	F	F	F	F	6	NO
19993	396	920211	041232.53	20	81	0	0	0	0	F	F	F	F	6	NO
17181	334	920211	090453.32	0	0	0	8	0	0	F	F	F	F	6	NO
17698	398	920207	072820.65	0	0	0	15	0	0	F	F	F	F	6	NO
15938	398	920208	094731.68	0	0	0	15	0	0	F	F	F	F	6	NO
2435	399	920211	113545.63	0	0	0	15	0	0	F	F	F	F	6	NO
21491	399	920211	121422.99	0	0	0	8	0	0	F	F	F	F	6	NO
18693	399	920211	171026.39	0	0	0	8	0	0	F	F	F	F	6	NO
19170	404	920211	041535.20	20	12	0	0	0	0	F	F	F	F	6	NO
17130	329	920211	003102.63	0	56	0	38	100	0	T	F	F	F	6	NO
18779	232	920211	083330.45	0	0	0	8	0	0	F	F	F	F	6	NO
10202	399	920211	021535.47	0	0	0	15	0	0	F	F	F	F	6	NO
324	396	920213	100130.79	0	0	0	15	0	0	F	F	F	F	6	NO
9829	232	920211	073938.33	20	83	0	0	0	0	F	F	F	F	6	NO
3560	399	920211	135429.55	0	0	0	15	0	0	F	F	F	F	6	NO
87207	233	920211	094501.10	0	96	20	0	0	0	F	F	F	F	6	NO
4856	385	920124	052920.50	0	0	0	15	0	0	F	F	F	F	6	NO
739	232	920211	051429.24	0	0	0	8	0	0	F	F	F	F	6	NC
8084	396	920122	120013.03	40	0	0	69	100	0	F	F	T	F	6	NO
7851	393	920211	215900.43	0	0	0	8	0	0	F	F	F	F	6	NO
88033	231	920211	103545.78	100	69	0	0	25	0	F	F	T	T	6	NO
88076	398	920211	085725.14	0	0	0	15	0	0	F	F	F	F	6	NO
14925	399	920211	031835.67	0	0	0	8	0	0	F	F	F	F	6	NO
11	398	920209	120409.88	0	0	0	15	0	0	F	F	F	F	6	NO
14839	399	920211	051618.88	0	0	0	8	0	0	F	F	F	F	6	NO
14483	231	920211	103954.72	0	0	0	15	0	0	F	F	F	F	6	NO
10519	398	920126	220347.36	0	0	0	15	0	0	F	F	F	F	6	NO
88848	398	920209	024650.96	0	0	0	15	0	0	F	F	F	F	6	NO
14478	232	920211	091049.88	0	84	47	0	0	0	F	F	F	F	6	NO
5197	399	920211	031524.53	0	0	0	15	0	0	F	F	F	F	6	NO
5242	242	920210	230113.87	20	72	31	52	50	0	F	F	F	F	6	NO
13757	398	920208	120547.77	0	0	0	8	0	0	F	F	F	F	6	NO
10659	395	920210	223518.82	0	0	0	8	0	0	F	F	F	F	6	NO
6752	396	920211	175606.24	0	0	0	15	0	0	F	F	F	F	6	NO
10470	399	920211	204343.29	0	0	0	8	0	0	F	F	F	F	6	NO
7376	334	920211	034516.97	100	0	0	0	0	0	F	F	F	T	6	NO
5763	390	920211	224607.33	0	0	0	8	0	0	F	F	F	F	6	NO
7488	398	920129	235511.74	0	0	0	15	0	0	F	F	F	F	6	NO
4330	385	920211	113648.71	0	0	0	8	0	0	F	F	F	F	6	NO
9951	398	920129	235638.11	0	0	0	8	0	0	F	F	F	F	6	NO
13878	241	920213	174726.68	0	100	0	0	0	0	F	F	F	F	6	NO
7842	398	920210	093716.01	0	88	0	15	0	0	F	F	F	F	6	NO
13878	241	920211	174508.59	0	100	0	0	0	0	F	F	F	F	6	NO
12330	393	920211	125935.77	0	0	0	0	0	0	F	F	F	F	5	NO
88847	382	920211	081010.75	0	0	0	0	0	0	F	F	F	F	5	NO
18512	399	920211	154408.01	0	0	0	0	0	0	F	F	F	F	5	NO
12733	398	920208	050624.96	0	0	0	0	0	0	F	F	F	F	5	NO
19106	398	920205	130741.94	0	0	0	0	0	0	F	F	F	F	5	NO
19136	232	920211	101116.87	0	0	0	0	0	0	F	F	F	F	5	NO

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12644	398	920122	075031.28	0	0	0	0	0	0	F	F	F	F	5	NO
12897	404	920210	203832.62	0	0	0	0	0	0	F	F	F	F	5	NO
13073	396	920211	100014.31	0	0	0	0	0	0	F	F	F	F	5	NO
13458	399	920211	060733.76	0	0	0	0	0	0	F	F	F	F	5	NO
10476	399	920211	143905.62	0	0	0	0	0	0	F	F	F	F	5	NO
18864	399	920211	031423.87	0	0	0	0	0	0	F	F	F	F	5	NO
10269	232	920211	091904.06	0	0	0	0	0	0	F	F	F	F	5	NO
11028	231	920211	075734.75	0	0	0	0	0	0	F	F	F	F	5	NO
21859	241	920211	173725.84	0	0	0	0	0	0	F	F	F	F	5	NO
21860	399	920211	225929.42	0	0	0	0	0	0	F	F	F	F	5	NO
14556	399	920211	171336.64	0	0	0	0	0	0	F	F	F	F	5	NO
14467	396	920211	184253.95	0	0	0	0	0	0	F	F	F	F	5	NO
14978	242	920210	225947.88	0	0	0	0	0	0	F	F	F	F	5	NO
14910	396	920211	100130.79	0	0	0	0	0	0	F	F	F	F	5	NO
15053	393	920211	130111.60	0	0	0	0	0	0	F	F	F	F	5	NO
14608	232	920211	050948.16	0	0	0	0	0	0	F	F	F	F	5	NO
14445	399	920211	004827.72	0	0	0	0	0	0	F	F	F	F	5	NO
14420	242	920210	224225.01	0	0	0	0	0	0	F	F	F	F	5	NO
14565	399	920211	133658.51	0	0	0	0	0	0	F	F	F	F	5	NO
10659	222	920210	201619.90	0	0	0	0	0	0	F	F	F	F	5	NO
21686	396	920211	041302.14	0	0	0	0	0	0	F	F	F	F	5	NO
18997	241	920211	175726.50	0	0	0	0	0	0	F	F	F	F	5	NO
18589	232	920211	073121.06	0	0	0	0	0	0	F	F	F	F	5	NO
19006	399	920211	142551.88	0	0	0	0	0	0	F	F	F	F	5	NO
88856	399	920211	133615.76	0	0	0	0	0	0	F	F	F	F	5	NO
19293	399	920211	044449.29	0	0	0	0	0	0	F	F	F	F	5	NO
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12979	383	920211	144346.45	0	0	0	0	0	0	F	F	F	F	5	NO
18589	232	920211	073142.81	0	0	0	0	0	0	F	F	F	F	5	NO
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21660	399	920211	131426.94	0	0	0	0	0	0	F	F	F	F	5	NO
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21523	222	920210	200720.38	0	0	0	0	0	0	F	F	F	F	5	NO
21448	399	920211	111637.67	0	0	0	0	0	0	F	F	F	F	5	NO
10211	398	920205	130558.03	0	0	0	0	0	0	F	F	F	F	5	NO
21461	382	920211	113026.17	0	0	0	0	0	0	F	F	F	F	5	NO
3783	232	920211	051401.39	0	0	0	0	0	0	F	F	F	F	5	NO
18511	393	920211	190907.62	0	0	0	0	0	0	F	F	F	F	5	NO
58	398	920206	050941.81	0	0	0	0	0	0	F	F	F	F	5	NO
2222	232	920211	083534.22	0	0	0	0	0	0	F	F	F	F	5	NO
21340	398	920128	233002.62	0	0	0	0	0	0	F	F	F	F	5	NO
3173	393	920211	122819.47	0	0	0	0	0	0	F	F	F	F	5	NO
21339	399	920211	223152.10	0	0	0	0	0	0	F	F	F	F	5	NO
20572	369	920211	125102.11	0	0	0	0	0	0	F	F	F	F	5	NO
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20572	369	920211	125102.11	0	0	0	0	0	0	F	F	F	F	5	NO
3343	399	920211	111025.10	0	0	0	0	0	0	F	F	F	F	5	NO
21011	369	920211	023152.07	0	0	0	0	0	0	F	F	F	F	5	NO
21137	398	920209	024851.13	0	0	0	0	0	0	F	F	F	F	5	NO
4738	232	920211	051116.85	0	92	10	8	0	0	F	F	F	F	5	NO
21049	369	920211	175348.96	0	0	0	0	0	0	F	F	F	F	5	NO
21058	398	920209	120544.80	0	0	0	0	0	0	F	F	F	F	5	NO
21049	369	920211	175348.96	0	0	0	0	0	0	F	F	F	F	5	NO
20572	369	920211	125242.03	0	0	0	0	0	0	F	F	F	F	5	NO
4594	396	920211	012805.72	0	0	0	0	0	0	F	F	F	F	5	NO
21318	232	920211	060157.17	0	0	0	0	0	0	F	F	F	F	5	NO

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21250	232	920211	090006.51	0	0	0	0	0	0	F	F	F	F	5	NO
196	398	920112	212622.32	0	0	0	0	0	0	F	F	F	F	5	NO
20572	369	920211	125204.88	0	0	0	0	0	0	F	F	F	F	5	NO
3818	398	920205	130741.94	0	76	0	23	0	0	F	F	F	F	5	NO
21196	232	920211	083534.22	0	0	0	0	0	0	F	F	F	F	5	NO
3592	396	920211	122444.75	0	0	0	0	0	0	F	F	F	F	5	NO
20308	393	920211	191058.55	0	0	0	0	0	0	F	F	F	F	5	NO
18279	221	920210	211939.45	0	0	0	0	0	0	F	F	F	F	5	NO
18946	242	920211	180017.19	0	0	0	0	0	0	F	F	F	F	5	NO
18257	396	920211	175645.72	0	0	0	0	0	0	F	F	F	F	5	NO
88888	242	920210	225302.73	0	0	0	0	0	0	F	F	F	F	5	NO
16396	242	920210	225805.88	0	0	0	0	0	0	F	F	F	F	5	NO
88922	399	920211	044449.29	0	0	0	0	0	0	F	F	F	F	5	NO
18467	393	920211	191058.55	0	0	0	0	0	0	F	F	F	F	5	NO
17754	393	920211	182853.30	0	0	0	0	0	0	F	F	F	F	5	NO
88737	242	920211	173530.30	0	0	0	0	0	0	F	F	F	F	5	NO
17216	399	920211	123304.12	0	0	0	0	0	0	F	F	F	F	5	NO
17130	399	920211	031640.59	0	0	0	0	0	0	F	F	F	F	5	NO
16953	399	920211	080552.99	0	0	0	0	0	0	F	F	F	F	5	NO
17481	399	920204	215632.71	0	76	0	23	0	0	F	F	F	F	5	NO
16939	334	920211	125157.84	0	0	0	0	0	0	F	F	F	F	5	NO
88788	385	920211	223247.69	0	0	0	0	0	0	F	F	F	F	5	NO
16391	396	920211	205728.86	0	0	0	0	0	0	F	F	F	F	5	NO
15789	399	920211	203800.34	0	0	0	0	0	0	F	F	F	F	5	NO
19952	398	920208	120622.29	0	0	0	0	0	0	F	F	F	F	5	NO
19877	398	920206	143035.10	0	0	0	0	0	0	F	F	F	F	5	NO
20123	334	920211	165652.54	20	29	0	0	50	0	F	F	F	F	5	NO
20129	221	920210	211856.51	0	0	0	0	0	0	F	F	F	F	5	NO
20282	383	920211	144236.15	0	0	0	0	0	0	F	F	F	F	5	NO
20281	221	920210	202258.95	0	0	0	0	0	0	F	F	F	F	5	NO
15555	393	920211	191315.07	0	0	0	0	0	0	F	F	F	F	5	NO
19659	398	920206	095138.79	0	0	0	0	0	0	F	F	F	F	5	NO
16390	399	920211	080708.77	0	0	0	0	0	0	F	F	F	F	5	NO
16229	399	920211	110625.25	0	0	0	0	0	0	F	F	F	F	5	NO
15741	385	920211	090946.74	0	0	0	0	0	0	F	F	F	F	5	NO
19608	399	920211	031726.20	0	0	0	0	0	0	F	F	F	F	5	NO
15267	232	920211	050842.67	0	0	0	0	0	0	F	F	F	F	5	NO
1806	396	920211	065634.61	20	73	0	0	0	0	F	F	F	F	5	NO
15680	242	920210	224446.40	0	0	0	0	0	0	F	F	F	F	5	NO
5685	399	920211	080758.15	0	0	0	0	0	0	F	F	F	F	5	NO
9921	231	920211	064649.66	0	92	0	0	0	0	F	F	F	F	5	NO
10629	398	920209	024650.96	0	0	0	0	0	0	F	F	F	F	5	NO
10365	242	920230	230559.01	0	0	0	0	0	0	F	F	F	F	5	NO
10262	399	920211	220531.05	0	0	0	0	0	0	F	F	F	F	5	NO
21552	241	920211	173159.75	0	0	0	0	0	0	F	F	F	F	5	NO
21635	334	920211	165652.54	20	77	0	0	50	0	F	F	F	F	5	NO
10436	395	920210	223448.82	0	0	0	0	0	0	F	F	F	F	5	NO
10252	232	920211	091049.88	0	0	0	0	0	0	F	F	F	F	5	NO
12694	399	920211	051519.34	0	0	0	0	0	0	F	F	F	F	5	NO
12497	398	920206	150321.55	0	0	3	0	0	0	F	F	F	F	5	NO
12445	398	920208	050819.64	0	0	0	0	0	0	F	F	F	F	5	NO
12295	399	920211	113622.28	0	0	0	0	0	0	F	F	F	F	5	NO
13390	232	920211	083352.26	0	0	0	0	0	0	F	F	F	F	5	NO
13503	398	920208	094840.97	0	0	0	0	0	0	F	F	F	F	5	NO
12102	399	920113	055312.35	80	0	0	0	0	100	F	F	T	F	5	NO
10837	242	920210	223225.69	0	0	0	0	0	0	F	F	F	F	5	NO
88025	398	920122	075031.28	0	0	0	0	0	0	F	F	F	F	5	NO
87568	399	920211	051807.34	0	0	0	0	0	0	F	F	F	F	5	NO
87403	222	920211	121038.61	0	0	0	0	0	0	F	F	F	F	5	NO
87338	232	920211	083843.59	0	0	0	0	0	0	F	F	F	F	5	NO
87328	232	920211	092159.30	0	0	0	0	0	0	F	F	F	F	5	NO
87855	399	920211	051730.95	0	0	0	0	0	0	F	F	F	F	5	NO
87660	232	920211	084538.84	0	0	0	0	0	0	F	F	F	F	5	NO

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10629	399	920210	235556.63	0	0	0	0	0	0	F	F	F	F	5	NO
10894	398	920209	023857.23	0	0	0	0	0	0	F	F	F	F	5	NO
21723	399	920211	203747.63	0	0	0	0	0	0	F	F	F	F	5	NO
12959	398	920204	143907.98	0	0	0	0	0	0	F	F	F	F	5	NO
12698	232	920211	101116.87	0	0	0	0	0	0	F	F	F	F	5	NO
12849	399	920211	174723.14	0	88	0	0	0	0	F	F	F	F	5	NO
12959	398	920209	024051.34	0	0	0	0	0	0	F	F	F	F	5	NO
21404	232	920211	051401.39	0	0	0	0	0	0	F	F	F	F	5	NO
10184	385	920210	234322.80	0	0	0	0	0	0	F	F	F	F	5	NO
9982	242	920210	230431.24	0	0	0	0	0	0	F	F	F	F	5	NO
10010	398	920129	235410.28	0	0	0	0	0	0	F	F	F	F	5	NO
10144	399	920211	152506.47	0	0	0	0	0	0	F	F	F	F	5	NO
10013	363	920211	131940.26	0	0	0	0	0	0	F	F	F	F	5	NO
9962	399	920211	101933.53	0	0	0	0	0	0	F	F	F	F	5	NO
9951	399	920211	102022.85	0	0	0	0	0	0	F	F	F	F	5	NO
8302	399	920211	031835.67	0	0	0	0	0	0	F	F	F	F	5	NO
8405	398	920206	145927.72	0	0	0	0	0	0	F	F	F	F	5	NO
7850	393	920211	182446.10	0	0	0	0	0	0	F	F	F	F	5	NO
7943	399	920211	011211.40	0	0	0	0	0	0	F	F	F	F	5	NO
8159	396	920211	122444.75	0	0	0	0	0	0	F	F	F	F	5	NO
8133	398	920129	235803.60	0	0	0	0	0	0	F	F	F	F	5	NO
88847	399	920211	080706.10	0	88	0	0	0	0	F	F	F	F	5	NO
88812	399	920211	135503.63	0	0	0	0	0	0	F	F	F	F	5	NO
13016	242	920210	232656.94	20	73	0	0	0	0	F	F	F	F	5	NO
14416	398	920128	233002.62	0	0	0	0	0	0	F	F	F	F	5	NO
12987	232	920211	051116.85	0	4	0	0	0	0	F	F	F	F	5	NO
10211	398	920200	095345.03	0	0	0	0	0	0	F	F	F	F	5	NO
21452	395	920210	223618.82	0	0	0	0	0	0	F	F	F	F	5	NO
88737	242	920211	173743.47	0	92	0	0	0	0	F	F	F	F	5	NO
88788	399	920211	031726.25	0	0	0	0	0	0	F	F	F	F	5	NO
88933	232	920211	100816.72	0	0	0	0	0	0	F	F	F	F	5	NO
88868	388	920211	072951.39	0	0	0	0	0	0	F	F	F	F	5	NO
88917	398	920205	025353.20	0	0	0	0	0	0	F	F	F	F	5	NO
88884	398	920204	110819.68	0	0	0	0	0	0	F	F	F	F	5	NO
88764	399	920208	211808.34	0	0	0	0	0	0	F	F	F	F	5	NO
88919	399	920211	220531.05	0	0	0	0	0	0	F	F	F	F	5	NO
87351	398	920209	151846.06	0	0	0	0	0	0	F	F	F	F	5	NO
87380	398	920210	094052.78	0	0	0	0	0	0	F	F	F	F	5	NO
1808	399	920211	171401.23	0	0	0	0	0	0	F	F	F	F	5	NO
1312	396	920210	235934.85	0	0	0	0	0	0	F	F	F	F	5	NO
655	232	920211	091049.88	0	0	0	0	0	0	F	F	F	F	5	NO
2353	393	920211	224222.40	0	0	0	0	0	0	F	F	F	F	5	NO
1576	398	920205	025047.47	0	0	0	0	0	0	F	F	F	F	5	NO
558	399	920211	113747.66	0	0	0	0	0	0	F	F	F	F	5	NO
21324	399	920211	101030.77	0	0	0	0	0	0	F	F	F	F	5	NO
3292	232	920211	083534.22	0	0	0	0	0	0	F	F	F	F		NO
3713	399	920211	100951.00	0	0	0	0	0	0	F	F	F	F	5	NO
20572	369	920211	125204.88	0	0	0	0	0	0	F	F	F	F	5	NO
4178	393	920211	182853.30	0	0	0	0	0	0	F	F	F	F	5	NO
3094	399	920231	051618.88	0	0	0	0	0	0	F	F	F	F	5	NO
20572	369	920211	125242.03	0	0	0	0	0	0	F	F	F	F	5	NO
45	393	920211	224415.30	0	0	0	0	0	0	F	F	F	F	5	NO
133	232	920211	092159.30	0	0	0	0	0	0	F	F	F	F	5	NO
3555	399	920211	111558.36	0	0	0	0	0	0	F	F	F	F	5	NO
20330	385	920211	090946.74	0	0	0	0	0	0	F	F	F	F	5	NO
19995	398	920205	121100.27	0	0	0	0	0	0	F	F	F	F	5	NO
19574	233	920211	094223.80	0	0	0	0	0	0	F	F	F	F	5	NO
19771	398	920206	150119.14	0	0	0	0	0	0	F	F	F	F	5	NO
20307	396	920213	071938.63	0	0	0	0	0	0	F	F	F	F	5	NO
20258	232	920211	085815.60	40	97	0	0	0	0	F	F	F	T	5	NO
2685	398	920123	042117.61	0	0	0	0	0	0	F	F	F	F	5	NO
12	398	920131	192541.67	0	0	0	0	0	0	F	F	F	F	5	NO
2092	398	920206	145927.72	0	0	0	0	0	0	F	F	F	F	5	NO
2337	232	920211	094315.63	0	0	0	0	0	0	F	F	F	F	5	NO

SAT	SNSR	DATE	TIME	OBS	U	V	W	W>10	ID	FH	HALO	AGE	σ	RANK	EXPERT
3670	398	920208	132630.42	0	0	0	0	0	0	F	F	F	F	5	NO
20406	242	920210	224624.95	0	0	0	0	0	0	F	F	F	F	5	NO
3267	398	920205	121901.77	0	0	0	0	0	0	F	F	F	F	5	NO
20572	369	920211	125034.71	0	0	0	0	0	0	F	F	F	F	5	NO
88056	385	920124	052920.50	0	0	0	0	0	0	F	F	F	F	5	NO
88061	399	920211	041108.28	0	0	0	0	0	0	F	F	F	F	5	NO
88065	399	920211	112934.68	0	0	0	0	0	0	F	F	F	F	5	NO
87308	390	920211	081725.53	0	0	0	0	0	0	F	F	F	F	5	NO
87308	396	920211	081735.39	20	68	0	13	0	0	F	F	F	F	5	NO
88045	398	920201	003122.15	0	0	0	0	0	0	F	F	F	F	5	NO
88074	242	920211	175401.07	0	0	0	0	0	0	F	F	F	F	5	NO
88034	383	920211	025459.73	0	0	0	0	0	0	F	F	F	F	5	NO
88028	398	920205	025953.06	0	0	0	0	0	0	F	F	F	F	5	NO
88102	399	920113	055509.31	0	0	0	0	0	0	F	F	F	F	5	NO
88127	398	920121	012425.76	0	0	0	0	0	0	F	F	F	F	5	NO
88076	398	920119	172158.36	0	0	0	0	0	0	F	F	F	F	5	NO
88454	369	920211	043121.74	0	0	0	0	0	0	F	F	F	F	5	NO
87295	399	920211	110649.27	0	0	0	0	0	0	F	F	F	F	5	NO
87301	399	920211	225812.65	0	0	0	0	0	0	F	F	F	F	5	NO
155	393	920211	183000.53	0	0	0	0	0	0	F	F	F	F	5	NO
21211	232	920211	063534.22	0	0	0	0	0	0	F	F	F	F	5	NO
21013	369	920211	[illegible]	0	0	0	0	0	0	F	F	F	F	5	NO
3492	232	920211	083244.24	0	0	0	0	0	0	F	F	F	F	5	NO
4613	399	920211	031835.67	0	0	0	0	0	0	F	F	F	F	5	NO
341	398	920207	120727.41	0	0	0	0	0	0	F	F	F	F	5	NO
21150	398	920208	120547.77	0	0	0	0	0	0	F	F	F	F	5	NO
4141	399	920211	080648.38	0	88	0	0	0	0	F	F	F	F	5	NO
87306	399	920201	222215.38	0	0	0	0	0	0	F	F	F	F	5	NO
21057	398	920209	120409.88	0	0	0	0	0	0	F	F	F	F	5	NO
3790	399	920203	220536.85	0	0	0	0	0	0	F	F	F	F	5	NO
3790	399	920204	215632.71	0	0	0	0	0	0	F	F	F	F	5	NO
3741	399	920211	011447.48	0	0	0	0	0	0	F	F	F	F	5	NO
13080	398	920208	215817.34	0	0	0	0	0	0	F	F	F	F	5	NO
6752	399	920211	135429.55	0	0	0	0	0	0	F	F	F	F	5	NO
5076	399	920211	015337.55	0	0	0	0	0	0	F	F	F	F	5	NO
5994	398	920129	235327.88	0	0	0	0	0	0	F	F	F	F	5	NO
5014	399	920211	204343.29	0	0	0	0	0	0	F	F	F	F	5	NO
4976	393	920213	182730.53	0	0	0	0	0	0	F	F	F	F	5	NO
5148	393	920211	224758.63	0	0	0	0	0	0	F	F	F	F	5	NO
5093	396	920211	184313.72	0	0	0	0	0	0	F	F	F	F	5	NO
4857	398	920210	094052.78	0	0	0	0	0	0	F	F	F	F	5	NO
6118	399	920211	015828.34	0	0	0	0	0	0	F	F	F	F	5	NO
6844	393	920211	190627.82	0	0	0	0	0	0	F	F	F	F	5	NO
6675	232	920211	092047.21	0	4	0	8	0	0	F	F	F	F	5	NO
6676	232	920211	084307.59	0	0	0	0	0	0	F	F	F	F	5	NO
6278	242	920210	231048.99	0	0	0	0	0	0	F	F	F	F	5	NO
6779	233	920211	094655.26	0	0	0	0	0	0	F	F	F	F	5	NO
7137	393	920211	191315.07	0	0	0	0	0	0	F	F	F	F	5	NO
7182	399	920211	051543.14	0	0	0	0	0	0	F	F	F	F	5	NO
6843	221	920210	211850.51	0	0	0	0	0	0	F	F	F	F	5	NO
5638	393	920211	224607.33	0	4	0	8	0	0	F	F	F	F	5	NO
5498	241	920211	174940.71	40	3	0	11	33	0	F	F	F	T	5	NO
13780	334	920211	131457.86	0	0	0	0	0	0	F	F	F	F	5	NO
15166	369	920211	180123.28	0	0	0	0	0	0	F	F	F	F	5	NO
13971	221	920210	211939.45	0	0	0	0	0	0	F	F	F	F	5	NO
14131	398	920129	235803.60	0	0	0	0	0	0	F	F	F	F	5	NO
14236	399	920211	055928.29	0	0	0	0	0	0	F	F	F	F	5	NO
13554	242	920211	175610.24	0	0	0	0	0	0	F	F	F	F	5	NO
13609	385	920124	052920.50	0	0	0	0	0	0	F	F	F	F	5	NO
15166	369	920211	180123.26	0	0	0	0	0	0	F	F	F	F	5	NO
15166	369	920211	180510.43	0	0	0	0	0	0	F	F	F	F	5	NO
88699	382	920211	081020.79	0	0	0	0	0	0	F	F	F	F	5	NO
88540	399	920211	011248.91	0	0	0	0	0	0	F	F	F	F	5	NO
15214	398	920205	121901.77	0	0	0	0	0	0	F	F	F	F	5	NO

SAT	SNSR	DATE	TIME	OBS	U	V	W	W>10	IO	FH	HALO	AGE	σ	RANK	EXPERT
15205	399	920211	102223.01	0	0	0	0	0	0	F	F	F	F	5	NO
15166	369	920211	180510.43	0	0	0	0	0	0	F	F	F	F	5	NO
15166	369	920211	180316.94	0	0	0	0	0	0	F	F	F	F	5	NO
15166	369	920211	180316.94	0	0	0	0	0	0	F	F	F	F	5	NO
9795	399	920211	015700.30	0	0	0	0	0	0	F	F	F	F	5	NO
7780	398	920119	171712.01	0	0	0	0	0	0	F	F	F	F	5	NO
4841	232	920211	073846.40	0	0	0	0	0	0	F	F	F	F	5	NO
7794	399	920211	135603.88	0	0	0	0	0	0	F	F	F	F	5	NO
4759	384	920207	161921.30	0	0	0	0	0	0	F	F	F	F	5	NO
8513	242	920210	224923.21	0	0	0	0	0	0	F	F	F	F	5	NO
21656	745	920126	083727.69	0	48	50	0	0	0	F	F	F	F	4	NO
10198	241	920211	175828.40	20	70	0	12	50	0	F	F	F	F	4	NO
14167	232	920211	093948.48	20	59	0	0	0	0	F	F	F	F	4	NO
87980	398	920208	132444.34	0	16	0	0	0	0	F	F	F	F	4	NO
3825	232	920231	091839.88	0	52	0	23	0	0	F	F	F	F	4	NO
18241	396	920211	065558.62	20	32	0	0	50	0	F	F	F	F	4	NO
14825	222	920211	120805.44	20	52	0	0	0	0	F	F	F	F	4	NO
6846	242	920210	223052.30	0	24	0	8	0	0	F	F	F	F	4	NO
19150	745	920126	083727.69	0	36	0	15	0	0	F	F	F	F	4	NO
20129	398	920131	234032.22	0	80	0	0	0	0	F	F	F	F	4	NO
10445	385	920211	090645.29	20	41	0	0	0	0	F	F	F	F	4	NO
10449	242	920210	224554.37	20	88	38	17	50	0	F	F	F	F	4	NO
2997	221	920210	210416.94	0	28	0	15	0	0	F	F	F	F	4	NO
11353	242	920210	223900.67	0	76	0	0	0	0	F	F	F	F	4	NO
21338	399	920211	111745.94	0	12	0	0	0	0	F	F	F	F	4	NO
20258	232	620211	085851.19	0	76	0	0	0	0	F	F	F	F	4	NO
8145	393	920211	191146.42	0	76	0	0	0	0	F	F	F	F	4	NO
21819	396	920211	081725.53	40	92	49	38	100	0	F	F	T	F	4	NO
87308	396	920211	061450.98	20	30	0	0	0	0	F	F	F	F	4	NO
88934	222	920210	200459.89	0	68	0	15	0	0	F	F	F	F	4	NO
14900	222	920211	120229.50	0	32	0	8	0	0	F	F	F	F	3	NO
14699	232	920211	095438.82	0	28	0	0	0	0	F	F	F	F	3	NO
14568	242	920210	224624.95	0	24	0	0	0	0	F	F	F	F	3	NO
13574	222	920210	200221.59	0	40	0	8	0	0	F	F	F	F	3	NO
15935	329	920211	212117.31	40	79	0	36	67	0	T	F	F	F	3	NO
19051	232	920211	091904.06	0	20	0	0	0	0	F	F	F	F	3	NO
19105	241	920211	174508.59	0	32	0	0	0	0	F	F	F	F	3	NO
4119	231	920211	064813.17	0	60	0	0	0	0	F	F	F	F	3	NO
3681	396	920211	061501.05	0	24	0	0	0	0	F	F	F	F	3	NO
15764	399	920211	111706.68	0	52	0	0	0	0	F	F	F	F	3	NO
4191	232	920211	091839.88	0	20	0	0	0	0	F	F	F	F	3	NO
6938	383	920211	131840.00	0	64	0	8	0	0	F	F	F	F	3	NO
13814	231	920213	104125.83	0	48	0	0	0	0	F	F	F	F	3	NO
14086	242	920210	232656.94	0	32	0	0	0	0	F	F	F	F	3	NO
13024	384	920207	161911.26	0	52	0	0	0	0	F	F	F	F	3	NO
12786	398	920208	094258.60	0	44	0	0	0	0	F	F	F	F	3	NO
13459	396	920211	100402.07	0	56	0	0	0	0	F	F	F	F	3	NO
10599	396	920211	061511.19	0	60	0	0	0	0	F	F	F	F	3	NO
21196	334	920114	105316.72	0	24	0	0	0	0	F	F	F	F	3	NO
8181	399	920211	102122.78	0	44	0	0	0	0	F	F	F	F	3	NO
14503	383	920128	114546.87	0	48	0	0	0	0	F	F	F	F	3	NO
20055	334	920211	123849.23	0	28	0	0	0	0	F	F	F	F	3	NO
87210	232	920211	051646.07	0	48	0	0	0	0	F	F	F	F	3	NO
21128	232	920211	053635.68	60	25	30	0	25	0	F	F	F	T	2	NO
87346	329	920211	083930.42	0	80	83	8	0	0	T	F	F	F	2	NO
20258	232	920211	082926.77	60	0	0	0	0	0	F	F	F	T	2	NO
21859	242	920211	174433.94	40	47	0	21	33	0	F	F	F	T	2	NO
1589	242	920211	174634.25	60	87	30	29	75	0	F	F	F	T	1	NO
10826	241	920211	173319.96	20	58	30	16	50	0	F	F	F	F	1	NO
739	232	920211	085524.11	20	34	0	0	0	0	F	F	F	T	0	NO
10286	231	920211	103614.94	60	91	53	3	50	0	F	F	F	T	0	NO
10445	242	920210	230020.69	40	90	0	0	33	0	F	F	F	T	0	NO
3509	329	920121	101515.05	0	0	0	0	0	0	T	F	F	F	0	NO
10454	232	920211	100816.72	60	96	0	10	50	0	F	F	F	T	0	NO

SAT	SNSR	DATE	TIME	OBS	U	V	W	W>10	ID	FH	HALO	AGE	σ	RANK	EXPERT
15596	329	920211	043719.26	0	60	0	0	0	0	T	F	F	F	0	NO
2226	329	920211	195801.70	0	0	0	0	0	0	T	F	F	F	0	NO
2167	232	920211	091049.88	40	77	0	30	67	0	F	F	F	T	0	NO
21827	329	920210	233944.99	0	0	0	0	0	0	T	F	F	F	0	NO
21819	396	920211	061450.98	20	100	76	15	0	0	F	F	T	F	0	NO
11683	396	920124	123835.16	20	0	0	26	50	0	F	F	T	F	0	NO
21723	329	920211	023952.93	0	0	0	0	0	0	T	F	F	F	0	NO
10826	242	920211	173350.45	40	83	66	2	67	0	F	F	F	T	0	NO
19352	329	920211	023952.93	0	20	0	15	0	0	T	F	F	F	0	NO
2531	951	920211	085949.03	40	0	0	0	0	0	F	F	F	T	0	NO
12232	329	920211	003102.63	0	0	0	0	0	0	T	F	F	F	0	NO
19235	242	920211	174634.25	20	91	66	39	50	0	F	F	T	F	0	NO
5095	329	920211	212305.36	0	0	0	0	0	0	T	F	F	F	0	NO
12782	329	920211	075245.98	0	0	0	15	0	0	T	F	F	F	0	NO
3555	329	920211	002701.70	0	0	0	0	0	0	T	F	F	F	0	NO
4594	329	920211	064807.63	0	0	0	8	0	0	T	F	F	F	0	NO
702	231	920211	103934.11	100	26	0	0	33	0	F	F	F	T	0	NO
11	222	920211	120320.58	20	18	0	0	0	0	F	F	F	T	0	NO
20399	232	920211	060043.22	20	8	0	0	0	0	F	F	F	T	0	NO
11	398	920114	202056.60	20	0	0	0	0	0	F	F	T	F	0	NO
21141	398	920114	201849.91	40	91	0	0	33	0	F	F	T	F	0	NO
21277	329	920211	194454.98	0	44	0	0	0	0	T	F	F	F	0	NO
702	231	920211	103545.78	100	83	53	0	33	0	F	F	F	T	0	NO
19877	242	920210	230244.97	20	42	60	0	50	0	F	F	F	T	0	NO
87272	396	920120	015332.70	20	0	28	0	0	0	F	F	T	F	0	NO
12201	233	920211	094615.92	20	86	28	28	50	0	F	F	F	T	0	NO
3558	329	920211	201457.39	0	0	0	15	0	0	T	F	F	F	0	NO
4008	232	920211	052307.17	60	67	26	1	25	0	F	F	F	T	0	NO
9666	242	920211	174250.79	20	88	41	6	0	0	F	F	F	T	0	NO
9666	241	920211	174235.53	20	83	48	0	50	0	F	F	F	T	0	NO
9506	232	920211	073057.02	40	64	30	0	33	0	F	F	F	T	0	NO
4053	231	920211	103545.78	100	0	0	21	33	0	F	F	F	T	0	NO
9827	329	920211	035432.62	0	0	0	0	0	0	T	F	F	F	0	NO
9973	329	920211	003102.63	0	0	0	0	0	0	T	F	F	F	0	NO
560	399	920211	104520.79	20	64	0	29	50	0	F	F	F	T	0	NO
341	329	920211	003053.61	0	0	0	0	0	0	T	F	F	F	0	NO
179	329	920211	043719.26	0	0	0	0	0	0	T	F	F	F	0	NO
5350	329	920211	194610.19	0	0	0	0	0	0	T	F	F	F	0	NO
4698	329	920211	064807.63	0	0	0	15	0	0	T	F	F	F	0	NO
13907	242	920210	223123.74	40	0	0	0	0	0	F	F	F	T	0	NO
21567	396	920211	041032.30	20	0	0	24	50	0	F	F	F	T	0	NO
88632	232	920211	084039.55	20	0	0	3	0	0	F	F	T	F	0	NO
21777	334	920211	123620.44	40	0	0	0	0	0	F	F	F	T	0	NO
15935	329	920211	083930.42	0	24	0	8	0	0	T	F	F	F	0	NO
88732	329	920211	003625.05	0	0	0	0	0	0	T	F	F	F	0	NO
21723	329	920211	023536.23	0	60	0	8	0	0	T	F	F	F	0	NO
15836	222	920210	200459.89	20	0	0	0	0	0	F	F	F	T	0	NO
13907	242	920210	223358.66	40	43	0	0	0	0	F	F	F	T	0	NO
5446	329	920211	212322.30	0	0	0	0	0	0	T	F	F	F	0	NO
6306	399	920113	055423.13	20	73	0	0	0	0	F	F	T	T	0	NO
14136	398	920131	234103.31	20	0	0	0	50	0	F	F	T	F	0	NO
19185	232	920211	073057.02	60	70	0	0	0	0	F	F	F	T	0	NO
7126	242	920210	230431.24	40	88	7	0	33	0	F	F	F	T	0	NO
19235	241	920211	174633.88	20	90	64	0	50	0	F	F	T	F	0	NO
21360	329	920211	195801.70	0	0	0	8	0	0	T	F	F	F	0	NO
87360	329	920211	070828.20	0	0	0	15	0	0	T	F	F	F	0	NO
16527	232	920211	051620.84	100	54	0	0	33	0	F	F	F	T	0	NO
13112	221	920210	200504.94	80	0	0	0	0	0	F	F	F	T	0	NO
16106	369	920211	201133.77	20	29	0	0	0	0	F	F	F	T	0	NO
12165	221	920210	195115.32	20	97	44	2	50	0	F	F	F	T	0	NO
16268	221	920210	195250.54	20	95	63	5	50	0	F	F	F	T	0	NO
16527	232	920211	051456.85	20	38	0	0	0	0	F	F	F	T	0	NO
17189	329	920211	194610.19	0	80	0	0	0	0	T	F	F	F	0	NO
18518	329	920211	040254.32	0	0	0	0	0	0	T	F	F	F	0	NO

SAT	SNSR	DATE	TIME	OBS	U	V	W	W>10	ID	FH	HALO	AGE	σ	RANK	EXPERT
8542	396	920117	115443.05	40	0	0	37	67	0	F	F	T	F	0	NO
7218	329	920211	080948.96	0	0	0	15	0	0	T	F	F	F	0	NO
8127	393	920211	125447.90	20	5	0	0	0	0	F	F	F	T	0	NO
7855	396	920119	123502.89	20	59	0	15	50	0	F	F	T	F	0	NO
18277	393	920211	125447.90	20	0	0	0	0	0	F	F	F	T	0	NO
17628	329	920211	003102.63	0	0	0	8	0	0	T	F	F	F	0	NO
6779	232	920211	095352.86	40	91	0	0	0	0	F	F	F	T	0	NO
14624	221	920210	211804.49	40	80	25	42	67	0	F	F	F	T	0	NO
15562	398	920129	235638.11	40	0	0	0	33	0	F	F	T	F	0	NO
15378	398	920131	192504.28	40	32	0	32	67	0	F	F	T	F	0	NO
5013	329	920211	212305.36	0	0	0	0	0	0	T	F	F	F	0	NO
19690	398	920114	201939.79	20	59	12	0	0	0	F	F	T	F	0	NO
19576	399	920113	055312.35	80	0	0	14	0	0	F	F	T	T	0	NO
15680	242	920210	230946.67	40	21	0	0	33	0	F	F	F	T	0	NO
13562	396	920211	205738.71	20	62	0	19	50	0	F	F	F	T	0	NO
13554	242	920210	225947.88	60	15	0	0	0	0	F	F	F	T	0	NO
21538	329	920117	033604.77	40	0	0	71	100	100	T	F	T	T	0	NO
15680	242	920210	224108.97	60	0	0	0	50	0	F	F	F	T	0	NO
13554	242	920211	175641.24	100	0	0	0	0	0	F	F	F	T	0	NO
13798	232	920211	054001.99	20	73	80	40	50	0	F	F	T	F	0	NO
16137	396	920211	091108.41	40	4	0	0	0	0	F	F	F	T	0	NO
20123	399	920211	225715.81	40	37	0	0	0	0	F	F	F	T	0	NO
20127	241	920211	172857.63	60	0	0	0	25	0	F	F	F	T	0	NO
14618	241	920211	172857.63	60	83	0	12	50	0	F	F	F	T	0	NO
14590	242	920210	223358.66	40	0	0	0	0	0	F	F	F	T	0	NO
88028	232	920211	090056.60	60	0	0	0	25	0	F	F	T	T	0	NO
14978	242	920210	223358.66	40	38	0	0	33	0	F	F	F	T	0	NO
88794	231	920211	064813.17	40	93	35	0	33	0	F	F	F	T	0	NO
14783	242	920210	224923.21	60	46	0	43	75	0	F	F	F	T	0	NO
14356	232	920211	052037.05	20	31	0	10	50	0	F	F	F	T	0	NO
14483	329	920211	121911.27	0	0	0	0	0	0	T	F	F	F	0	NO
20488	398	920129	235511.74	20	0	31	0	0	0	F	F	T	F	0	NO
7004	399	920113	055312.35	20	76	0	2	0	0	F	F	T	F	0	NO
20742	399	920211	174937.89	20	19	0	0	0	0	F	F	F	T	0	NO
21150	231	920211	075734.75	60	71	56	51	75	0	F	F	F	T	0	NO
14496	232	920211	083016.70	20	43	0	63	100	0	F	F	F	T	0	NO
14514	393	920211	215722.80	60	0	0	61	75	0	F	F	F	T	0	NO

APPENDIX E. SOURCE CODE

Global data types and procedures used by several routines are included in the listing IO.H. Source code for the parser used to screen the OCR files is contained in the C code listing FILTER.C. The track building algorithm and evaluation function are also in C and are given in TRACKER.C and the modules that follow. Finally, the expert system rules are in the CLIPS code listing called EVALUATE.CLP.

```
/*********************************** ***********************************/
/*                                                                      */
/*  FILE:       IO.H                                                    */
/*  SYSTEM:     PC                                                      */
/*  COMPILER:   Borland ANSI C                                          */
/*  LAST MOD:   22 June 92                                              */
/*  PURPOSE:    Contains global data types used by FILTER.C and TRACKER.C  */
/*              Also contains the I/O routines used by TRACKER.C        */
/*                                                                      */
/************************************************************************/
#include <STDIO.H>
#define TRUE 1
#define FALSE 0
#define MAX_OBS 110

/* GLOBAL TYPES */
  struct SAT_TYPE {
    char ID_SID[6];
    char INCLINATION[6];
    char PERIOD[8];
    char DRAG[8];
    char DESIG1[7];
    char DESIG2[7];
    char DESIG3[3];
    char RA[7];
    char ELSET_EPOCH[7];
  }; /* SAT_TYPE */

  struct OB_TYPE {
    char DATE[7];
    char TIME[10];
    char ALTITUDE[7];
    char U[7];
    char V[7];
    char W[7];
    char ID_SENSOR[6];
    char SENSOR[5];
  }; /* OB_TYPE */

struct STAT_TYPE {
  int JULIAN;
  int AGE;
  int OBS_IN_TRACK;
  float W_OVER_10;
  float POINTS;
  double DRAG;
  double PERIOD;
  double U_ave;
  double V_ave;
  double W_ave;
  double Ur;
  double Vr;
  double Wr;
  double U_sigma;
  double V_sigma;
  double W_sigma;
  int BAD_TRACK;
  int GOOD_TRACK;
  char ID_SENSOR[6];
  char ID_SID[6];
  char SENSOR[5];
}; /* STAT_TYPE */
```

```
struct FUZZY_TYPE {
  float W_OVER_10;
  float OBS_IN_TRACK;
  double DRAG;
  double Ur;
  double Vr;
  double Wr;
  int ID_MATCH;
  int BAD_TRACK;
  int GOOD_TRACK;
}; /* FUZZY_TYPE */

int OPENFILES(void);
/* Opens the global files IN, OUT, and STATS. Returns TRUE on success,
otherwise terminates the program */

int CLOSEFILES(void);
/* Closes all data files */

int GETSAT(char *S_STR, struct SAT_TYPE *S);
/* Reads a line from file IN, writes it to OUT, tokenizes it, and stores
results in variable pointed at by S. Returns 0 if blank line encountered,
1 if results successful, and terminates program on input error */

int PUTSAT(char *S_STR);
/* Writes the string S_STR to the file OUT. A simplistic routine included
for completeness */

int GETOBS(struct OB_TYPE OB[]);
/* Continually reads lines of data from file IN and stores results in array
OB. If successful, returns number of lines read. On array overflow, terminates
program. On input error, returns 0 */

int PUTOB(struct OB_TYPE OB);
/* Prints array OB to file OUT. Note that a new line character (\n) is
automatically inserted since it is part of token SENSOR */

int PUTTRACK(int ORDER[], struct OB_TYPE O[], int S, int F,
             struct FUZZY_TYPE DATA);
/* Writes the observations and statistical data for the track starting at
S and ending at F to the output file STATS */

int PUTRANK(int ORDER[], struct OB_TYPE O[], int S,
             struct STAT_TYPE DATA, struct FUZZY_TYPE, float RANK, char SAT[]);
/* Writes the rank, statistical data, track data, and satellite number
to output file TRACKS */
```

```c
/**************************************************************************/
/*                                                                        */
/*  FILE:       FILTER.C                                                  */
/*  SYSTEM:     PC                                                        */
/*  COMPILER:   Borland ANSI C                                            */
/*  LAST MOD:   13 July 92                                                */
/*  PURPOSE:    A simple parser for identifying errors produced by the OCR */
/*              software used to scan in the SID report                   */
/*                                                                        */
/**************************************************************************/

#include <STDLIB.H>
#include <CTYPE.H>
#include <STRING.H>
#include "IO.H"

int REMOVE_BLANKS(char *STR)
/* Removes stray blanks left in data by OCR software. Also determines if STR
is an empty string, ie, a string with only blanks. Returns TRUE if lines is
a blank line */
{
  int i;
  int j = 1;
  int ISBLANK = TRUE;

  if (strlen(STR) >= 3) {

    for (i=1; STR[i+1] != NULL; i++) {
      if (!((STR[i-1] != ' ') && (STR[i+1] != ' ') && (STR[i] == ' '))) {
         /* Remove singleton blanks inserted by the OCR software */
         STR[j++] = STR[i];
          if (!(isspace(STR[i]))) {
           /*  Keep track of all blank lines */
           ISBLANK = FALSE;
         } /* if */
      }; /* if*/
    }; /* for */

    STR[j] = NULL;
  } /* if */

  return(ISBLANK);
}; /* REMOVE BLANKS */


int ISNUM_TOKEN(const char *TOKEN)
/* Returns true if TOKEN is a fixed or floating number */
{
  int i;
  int DECIMAL_OK = TRUE;

  for (i=0; TOKEN[i] != NULL; i++) {

    if (!(isdigit(TOKEN[i]) ||
        ((TOKEN[i] == '.') && DECIMAL_OK))) {
      return(FALSE);
    } /* if */

    DECIMAL_OK = DECIMAL_OK && (TOKEN[i] != '.');
  }; /* for */

  return(TRUE);
}; /* ISNUM_TOKEN */
```

```
int ISNEGNUM_TOKEN(const char *TOKEN)
/* Screens a token to ensure it is a positive or negative number */
{
  int i;
  int DECIMAL_OK = TRUE;

  for (i=0; TOKEN[i] != NULL; i++) {

    if (!(isdigit(TOKEN[i]) ||
        ((TOKEN[i] == '.') && DECIMAL_OK) ||
        ((TOKEN[i] == '-') &&  (i == 0)))) {
      return(FALSE);
    } /* if */

    DECIMAL_OK = DECIMAL_OK && (TOKEN[i] != '.');
  }; /* for */

  return(TRUE);
}; /* ISNEGNUM_TOKEN */


int ISTIME_TOKEN(const char *TOKEN)
/* Screens a token to ensure it is a time. Screens for HHMMSS form and
ignores fractions of seconds */
{
  int OK_TIME = TRUE;

  /* First ensure the token is at least a number and within range */
  OK_TIME = (ISNUM_TOKEN(TOKEN) && atol(TOKEN) < 245959);

  if (OK_TIME) {

    long int TIME;
    TIME = atol(TOKEN);

    /* Check that minutes are less than 60 */
    TIME = TIME - (TIME/10000)*10000;
    OK_TIME = OK_TIME && (TIME <= 5959);

    /* Check that seconds are less than 60 */
    TIME = TIME - (TIME/100)*100;
    OK_TIME = OK_TIME && (TIME <= 59);
  } /* if */

  return(OK_TIME);
}; /* ISTIME_TOKEN */
```

```
int ISDATE_TOKEN(const char *TOKEN)
/* Screens a token to ensure it is a date. Screens for YYMMDD format */
{
  int i;
  int OK_DATE = TRUE;

  /* First ensure the token is at least a number and within range */
  OK_DATE = (ISNUM_TOKEN(TOKEN) && atol(TOKEN) < 991231);
  if (OK_DATE) {
    long int DATE;
    DATE = atol(TOKEN);

    /* Check that month is less than or equal to 12 */
    DATE = DATE - (DATE/10000)*10000;
    OK_DATE = OK_DATE && (DATE <= 1231);

    /* Check that days are less than 31 */
    DATE = DATE - (DATE/100)*100;
    OK_DATE = OK_DATE && (DATE <= 31);
  } /* if */

  return(OK_DATE);
}; /* ISDATE_TOKEN */


int PARSE_AND_FORMAT_SAT(char *S_ID, char *S_STR, FILE *OUT, FILE *ERROR)
/* Screens S_STR, checks for OCR errors and prints
cleaned up data to the output file. Logs OCR errors in the error file.
Returns the satellite ID number in variable S */
{
  char *TOKEN;
  int BAD_TOKEN = FALSE;
  int i;

  /* First token is the satellite ID number */
  strcpy(S_ID, strtok(S_STR, " "));
  fprintf(OUT, "%5s", S_ID);

  if (!(ISNUM_TOKEN(S_ID)) || atol(TOKEN)>99999) {
    /* Token contains a misinterpreted character in satellite ID number */
    BAD_TOKEN = TRUE;
    fprintf(ERROR, "%s%s\n", S_ID, ": Bad satellite ID");
  } /* if */

  for (i=1; i<=8; i++) {
    /* Screen line for eight more tokens (total of nine so far) */

    if (TOKEN = strtok('\0', " ")) {
      /* Got a token */
      switch(i) {
        case 2: /* The period field. Should be less than 1700 minutes */
                  fprintf(OUT, "%9s", TOKEN);
                  if (!(ISNUM_TOKEN(TOKEN)) || atoi(TOKEN)>1700 ) {
                    /* Token contains a misinterpreted character from OCR */
                    BAD_TOKEN = TRUE;
                    fprintf(ERROR, "%s%s%i\n", S_ID,
                                  ": Bad token, satellite field ", i);
                  } /* if */
                  break;
```

```
        case 3: /* The drag field. Can be a negative number */
                fprintf(OUT, "%9s", TOKEN);
                if (!(ISNEGNUM_TOKEN(TOKEN)) || atof(TOKEN)>.5) {
                   /* Token contains a misinterpreted character from OCR */
                   BAD_TOKEN = TRUE;
                   fprintf(ERROR, "%s%s%i\n", S_ID,
                                  ": Bad token, satellite field ", i);
                 } /* if */
                 break;

        case 4: /* First designation field */
                fprintf(OUT, "%4s", TOKEN);
                if (!(ISNUM_TOKEN(TOKEN))) {
                  /* Token contains a misinterpreted character from OCR */
                  BAD_TOKEN = TRUE;
                  fprintf(ERROR, "%s%s\n", S_ID,
                                 ": Bad token, satellite field 4");
                } /* if */
                break;

        case 5: /* Second designation field. Can be any alphanumeric */
                fprintf(OUT, "%4s", TOKEN);
                break;

        case 6: /* Third designation field. Any alphanumeric */
                fprintf(OUT, "%4s", TOKEN);
                break;

        case 8: /* Date field */
                fprintf(OUT, "%9s", TOKEN);
                if (!(ISDATE_TOKEN(TOKEN))) {
                  BAD_TOKEN = TRUE;
                  fprintf(ERROR, "%s%s%i\n", S_ID,
                                 ": Bad token, satellite field ", i);
                } /* if */
                break;

        default: /* Fields 2 and 7 are angles */
                 fprintf(OUT, "%9s", TOKEN);
                 if (!(ISNUM_TOKEN(TOKEN)) || atoi(TOKEN)>360) {
                   /* Token contains a misinterpreted character from OCR */
                   BAD_TOKEN = TRUE;
                   fprintf(ERROR, "%s%s%i\n", S_ID,
                                  ": Bad token, satellite field ", i);
                 } /* if */
                 break;

      } /* switch */

    } else {
      /* Was expecting a token, but could not find one */
      BAD_TOKEN = TRUE;
      fprintf(ERROR, "%s%s%i\n", S_ID, ": Ran out of tokens at ", i);
      break;
    }; /* if */

  }; /* for */

  /* Some lines my end with an ampersand */
  if (TOKEN == strtok('\0', " ")) {
    fprintf(OUT, "%3s", TOKEN);

    if (!(TOKEN[0] == '*')) {
      BAD_TOKEN = TRUE;
      fprintf(ERROR, "%s%s%i\n", S_ID, ": Bad ampersand");
    } /* if */
  } /* if */
```

```
  /* Finally, check for excess tokens */
  if (TOKEN = strtok('\0', " ")) {
    BAD_TOKEN = TRUE;
    fprintf(ERROR, "%s%s\n", S_ID, ": Too many tokens on satellite line");
  } /* if */

  fputc('\n', OUT);
  return(BAD_TOKEN);
} /* PARSE_AND_FORMAT_SAT */


int  PARSE_AND_FORMAT_OBS(char *S_ID, FILE *IN, FILE *OUT, FILE *ERROR)
/* Screens the observation data, checks for OCR errors and prints
cleaned up data to the output file. Logs OCR errors in the error file */
{
  char *TOKEN, OBS_STR[132];
  int BAD_TOKEN = FALSE;
  int i;

  for (; fgets(OBS_STR, 132, IN);) {
    /* Remove extraneous blanks and check for empty strings */
    if (!(REMOVE_BLANKS(OBS_STR))) {

      /* Tokenize the string if it isn't empty */
      TOKEN = strtok(OBS_STR, " ");

      for (i=1; i<=8; i++) {
        /* Screen line for eight tokens */
        if (TOKEN) {
          /* Got a token. First print it to the output file */

          if (i==1) {
            /* Print first token in extra wide field */
            fprintf(OUT, "%15s%c", TOKEN, ' ');
          } else {

            if (i==2) {
              /* Field 2 is the time field which does not include leading
              0's for times > 12:00. Add them to improve readability */
              fprintf(OUT, "%09.2f", atof(TOKEN));
            } else {
              fprintf(OUT, "%9s", TOKEN);
            } /* if */

          } /* if */

          /* Now check the token for errors from the OCR. */
          switch(i) {
            case 1: /* Date field */
                    if (!(ISDATE_TOKEN(TOKEN))) {
                      BAD_TOKEN = TRUE;
                      fprintf(ERROR, "%s%s%i\n", S_ID,
                                     ": Bad token, observation field ", i);
                    } /* if */
                    break;

              case 2: /* Time field */
                    if (!(ISTIME_TOKEN(TOKEN))) {
                      BAD_TOKEN = TRUE;
                      fprintf(ERROR, "%s%s%i\n", S_ID,
                                     ": Bad token, observation field ", i);
                    } /* if */
                    break;

              case 3: /* Altitude field */
                    if (!(ISNUM_TOKEN(TOKEN))) {
                      BAD_TOKEN = TRUE;
```

```
                fprintf(ERROR, "%s%s%i\n", S_ID,
                               ": Bad token, observation field ", i);
              } /* if */
              break;

          case 7: /* Sensor ID field. Value lies between 0 and 99999 */
              if (!(ISNUM_TOKEN(TOKEN)) || atoi(TOKEN)>99999) {
                BAD_TOKEN = TRUE;
                fprintf(ERROR, "%s%s%i\n", S_ID,
                               ": Bad token, observation field ", i);
              } /* if */
              break;

          case 8: /* Sensor field. Value between 221 and 951 */
              if (!(ISNUM_TOKEN(TOKEN)) || atoi(TOKEN) > 951 ||
                 atoi(TOKEN) < 221) {
                BAD_TOKEN = TRUE;
                fprintf(ERROR, "%s%s%i\n", S_ID,
                               ": Bad token, observation field ", i);
              } /* if */
              break;

          default: /* The U,V,W errors can be negative or positive*/
               if (!(ISNEGNUM_TOKEN(TOKEN))) {
                 BAD_TOKEN = TRUE;
                 fprintf(ERROR, "%s%s%i\n", S_ID,
                                ": Bad token, observation field ", i);
               } /* if */
               break;
        } /* switch */

      } else {
        /* Was expecting a token, but could not find one */
        BAD_TOKEN = TRUE;
        fprintf(ERROR, "%s%s%i\n", S_ID,
                       ": Ran out of observation tokens at ", i);
        break;
      }; /* if */

      /* Get the next token */
      TOKEN = strtok('\0', " ");
    }; /* for */

    /* Finally, check for excess tokens */
    if (TOKEN) {
      BAD_TOKEN = TRUE;
      fprintf(ERROR, "%s%s\n", S_ID,
                     ": Too many tokens on observation line");
    } /* if */

    fprintf(OUT, "\n");

  } else {
    /* End when a blank line is encountered */
    fprintf(OUT, "\n");
    return(BAD_TOKEN);
  }; /* if */

 }; /* for */

 return(BAD_TOKEN);
}; /* PARSE_AND_FORMAT_OB */
```

```
int main(void)
{
  FILE *INFILE, *OUTFILE, *ERRORFILE;
  char SAT_STR[132], SAT_ID[6];
  char LAST_SAT[6] = "00000";
  int BAD_CHARS = FALSE;
  int END_OF_FILE = FALSE;

  /* open the input file */
  if ((INFILE = fopen("\OBS","rt")) == NULL) {
    printf("Error opening file OBS");
    exit(1);
  } /* if */

  /* open the output files */
  if ((OUTFILE = fopen("\CLEAN","wt")) == NULL){
    printf("Error opening file CLEAN");
    exit(1);
  }; /* if */

  /* Open the error file */
  if ((ERRORFILE = fopen("\ERRORS","wt")) == NULL){
    printf("Error opening file ERROR");
    exit(1);
  }; /* if */

  do  {
    /* Cycle past empty strings or comment strings (that begin with !) */
    do {
      END_OF_FILE = !(fgets(SAT_STR, 132, INFILE));
    } /* do */

    while ((REMOVE_BLANKS(SAT_STR) || SAT_STR[0]=='!') &&
           (!(END_OF_FILE)));

    if (!(END_OF_FILE)) {
      /* Parse, error check, and output the line of satellite data. */
      BAD_CHARS = BAD_CHARS +
                  PARSE_AND_FORMAT_SAT(SAT_ID, SAT_STR, OUTFILE, ERRORFILE);

      if (atol(LAST_SAT) > atol(SAT_ID)) {
        /* SAT_ID numbers should be in ascending order. If not, OCR made an
        error. Handle by interrupting program */
        printf("Satellite ID numbers out of order: %s  %s", LAST_SAT, SAT_ID);
        exit(1);
      } else {
        strcpy(LAST_SAT, SAT_ID);
      } /* if */

      /* Parse, error check, and output all lines of observation data */
      BAD_CHARS = BAD_CHARS +
                  PARSE_AND_FORMAT_OBS(SAT_ID, INFILE, OUTFILE, ERRORFILE);
    } /* if */

  } while (!(END_OF_FILE));

  if (BAD_CHARS) {
    /* Errors were found in the input data */
    printf("Bad tokens discovered. Results in file ERRORS\n");
    exit(1);
  } /* if */

  fclose(INFILE);
  fclose(OUTFILE);
  fclose(ERRORFILE);
  return(0);
}; /* MAIN */
```

```
/***************************************************************************/
/*                                                                         */
/*  FILE:      TRACKER.C                                                   */
/*  SYSTEM:    PC                                                          */
/*  COMPILER:  Borland ANSI C                                              */
/*  LAST MOD:  22 June 92                                                  */
/*  PURPOSE:   Main program driver for the TRACKER program.                */
/*             sorts the data, generates tracks from the observations,     */
/*             and computes various statistical data for parametric        */
/*             evaluations                                                 */
/*                                                                         */
/***************************************************************************/

#include <STDIO.H>
#include <STDLIB.H>
#include <STRING.H>
#include "IO.H"
#include "SORTER.H"
#include "STATS.H"
#include "EVALUATE.H"

int main(void)
{
  int i, NUMBER_OF_OBS;           /* Number of observations in the current track */
  struct OB_TYPE OBS[MAX_OBS];    /* The array of observations */
  int OB_ORDER[MAX_OBS];          /* Array for storing sorted order of obs */
  struct SAT_TYPE SAT;            /* The current satellite */
  char SAT_STR[81];               /* String of satellite data read from input file */
  int TOTAL_OBS = 0;              /* Count of the total number of obs in file */
  int TOTAL_TRACKS = 1;           /* Count of the total number of tracks */
  struct FUZZY_TYPE FUZZY_BUFFER; /* A buffer for storing fuzzy track parameters */
  struct FUZZY_TYPE *FUZZY_DATA;  /* Pointer to the fuzzy buffer */

  /* Clear the screen */
  for (i=0; i<80; i++) printf("\n");

  /* Open the data files */
  OPENFILES();

  /* Initialize buffer pointer for fuzzy data */
  FUZZY_DATA = &FUZZY_BUFFER;

  /* Get a satellite */
  printf("Satellite:   Obs in track:  Total obs:  Total tracks:\n");
  while (GETSAT(SAT_STR, &SAT)) {

    int START;                                           /* First observation in current track */
    int OLD_START;                                       /* First observation in previous track*/
    int OLD_FINISH;                                      /* Last observation in previous track */
    int FINISH = -1;                                     /* Last observation in current track */
    float RANK;                                          /* The ranking of the current track */
    struct STAT_TYPE STAT_BUFFER1, STAT_BUFFER2;         /* Buffers the current and last track */
    struct STAT_TYPE *TEMP_DATA, *OLD_DATA, *CURRENT_DATA;  /*Buffers the track's statistical datA*/

    /*Write the satellite data to the output file */
    PUTSAT(SAT_STR);

    /* For each satellite, read in the obs associated with it */
    NUMBER_OF_OBS = GETOBS(OBS);
    TOTAL_OBS = TOTAL_OBS + NUMBER_OF_OBS;
    if (NUMBER_OF_OBS) {
      printf("%7s%14i%14i%14i\r", SAT.ID_SID, NUMBER_OF_OBS,
                                  TOTAL_OBS, TOTAL_TRACKS);

      /* Sort the array of observations */
      SORT(NUMBER_OF_OBS, OB_ORDER, OBS);
```

```
/* Put the first track in the buffer and initialize paramete.
BUILDTRACK(NUMBER_OF_OBS, OB_ORDER, OBS, &START, &FINISH);
OLD_START = START;
OLD_FINISH = FINISH;
OLD_DATA = &STAT_BUFFER1;
CURRENT_DATA = &STAT_BUFFER2;

/* Produce the stats for the first track */
STATS(OB_ORDER, OBS, OLD_START, OLD_FINISH, SAT, OLD_DATA);

while (FINISH < NUMBER_OF_OBS-1) {
  /* Build a track from a set of observations */
  BUILDTRACK(NUMBER_OF_OBS, OB_ORDER, OBS, &START, &FINISH);

  /* Compute the stats on each track */
  STATS(OB_ORDER, OBS, START, FINISH, SAT, CURRENT_DATA);

  /* Check to see if this track should be merged with the previous one.
  The algorithm here has a logic bug. If the current track SHOULD be
  merged with the following track, but CAN be merged with the previous,
  it will end up merged to the previous. Bug can be fixed with some
  effort, but for now will ignore it. */
  if (!(MERGE_TRACKS(OLD_DATA, CURRENT_DATA,
        OBS[OB_ORDER[OLD_FINISH]], OBS[OB_ORDER[START]]))) {

     /* Tracks did not merge. Write results to output file */
      FUZZY(OLD_DATA, FUZZY_DATA);
      PUTTRACK(OB_ORDER, OBS, OLD_START, OLD_FINISH, *FUZZY_DATA);

      /* Compute the rank of the track */
      RANK = EVALUATE((*FUZZY_DATA).OBS_IN_TRACK, (*FUZZY_DATA).W_OVER_10,
                      (*FUZZY_DATA).Ur, (*FUZZY_DATA).Vr,
                      (*FUZZY_DATA).Wr, (*FUZZY_DATA).ID_MATCH);

      /* Write the rank to the CLIPS input file */
      PUTRANK(OB_ORDER, OBS, OLD_START, *OLD_DATA, *FUZZY_DATA,
              RANK, SAT.ID_SID);

      /* Copy the current data to the old data buffer by swapping
      pointers */
      TEMP_DATA = OLD_DATA;
      OLD_DATA = CURRENT_DATA;
      CURRENT_DATA = TEMP_DATA;
      OLD_START = START;
      TOTAL_TRACKS++;
  } /* if */

  OLD_FINISH = FINISH;
 } /* while */

 /* Output the last track left in LAST_TRACK */
 FUZZY(OLD_DATA, FUZZY_DATA);
 PUTTRACK(OB_ORDER, OBS, OLD_START, OLD_FINISH, *FUZZY_DATA);
 RANK = EVALUATE((*FUZZY_DATA).OBS_IN_TRACK, (*FUZZY_DATA).W_OVER_10,
                 (*FUZZY_DATA).Ur, (*FUZZY_DATA).Vr,
                 (*FUZZY_DATA).Wr, (*FUZZY_DATA).ID_MATCH);
 PUTRANK(OB_ORDER, OBS, OLD_START, *OLD_DATA, *FUZZY_DATA, RANK,
         SAT.ID_SID);
 TOTAL_TRACKS++;

} else {
 /* Error occured reading the CLEAN file produced by FILTER routine */
 printf("\nError reading in clean observations for satellite %li",
        SAT.ID_SID);
 exit(0);
} /* if */
```

```
  } /* while */

  CLOSEFILES();

  printf("\nProgram complete\n");
  return(TRUE);

} /* main */
```

```
/***************************************************************************/
/*                                                                         */
/*  FILE:      SORTER.C                                                    */
/*  SYSTEM:    PC                                                          */
/*  COMPILER:  Borland ANSI C                                              */
/*  LAST MOD:  22 June 92                                                  */
/*  PURPOSE:   Sorts an array of observation by sensor and epoch. The      */
/*             actual array is not modified; rather, the results of the    */
/*             sort is stored in a seperate array called ORDER.            */
/*                                                                         */
/***************************************************************************/

#include <STRING.H>
#include <STDLIB.H>
#include "IO.H"

char *NEWKEY(char *K, char *S, char *D)
{
  strcpy(K, S);
  strcat(K, D);
  return(K);
} /* NEWKEY */

int SORT(int N, int ORDER[], struct OB_TYPE O[])
/* This is an insertion sort routine with a time complexity of O(n^2). It
can be quite costly for large n, however, for smaller sorts it is simple and
quick. Elements are priority sorted by SENSOR, DATE, TIME. No error handling.
N is the number of elements in the array O. To prevent physical rewrites of
the file, a second array ORDER is actually used to return the sorted order
of O. Sorting is based on sensor first, date second. */
{
  int i, j, k;
  char KEY[11], TEMPKEY[11];

  for (i=0; i<N; i++) ORDER[i] = i;
  for (j=1; j < N; j++) {

    /* Select the jth element */
    NEWKEY(KEY, O[j].SENSOR, O[j].DATE);
    i = j-1;

    while (i >= 0 && strcmp(NEWKEY(TEMPKEY, O[ORDER[i]].SENSOR, O[ORDER[i]].DATE), KEY)>0) {
      /* Look for a place to insert the jth element */
      k = ORDER[i];
      ORDER[i] = ORDER[i+1];
      ORDER[i+1] = k;
      i--;
    } /* while */

  } /* for */

  return(TRUE);
} /* SORT */
```

```
/***************************************************************************/
/*                                                                         */
/*  FILE:       STATS.C                                                    */
/*  SYSTEM:     PC                                                         */
/*  COMPILER:   Borland ANSI C                                             */
/*  LAST MOD:   15 Nov 922                                                 */
/*  PURPOSE:    Builds tracks from a list of observations, then computes  */
/*              statistical data about each track. Finally, determines    */
/*              the fuzzy set membership of the features used by the      */
/*              evaluation function                                        */
/*                                                                         */
/***************************************************************************/

#include <STDIO.H>
#include <STDLIB.H>
#include <STRING.H>
#include <MATH.H>
#include "IO.H"

int JULIAN(char DATE[])
/* Computes the equivalent julian date for the variable DATE */
{
  int J[] = {0, 0, 31, 59, 90, 120, 151, 181, 212, 243, 273, 304, 334, 365};
  char MONTH[3] = "  ";
  char DAY[3] = "  ";

  MONTH[0] = DATE[2];
  MONTH[1] = DATE[3];
  DAY[0] = DATE[4];
  DAY[1] = DATE[5];
  return(J[atoi(MONTH)]+ atoi(DAY));
}; /* JULIAN */

long int E_TIME(char D2[], char T2[], char D1[], char T1[])
/* Computes elapsed time between S2 and S1. Format is HHMMSS.SS. Returns
error if time passes through midnight */
{
  long int TIME1, TIME2;
  long int DELTA = 0;

  TIME1 = atol(T1);
  TIME2 = atol(T2);
  if (strcmp(D1, D2) != 0) {
    /* Dates are not the same. Must subtract dates to find true delta */
    long int JULIAN[] = {0, 0, 31, 59, 90, 120, 151, 181, 212, 243, 273, 304, 334, 365};
    long int DATE1, DATE2;

    DATE1 = atol(D1);
    DATE2 = atol(D2);

    /* Convert years to seconds */
    DELTA = ((DATE2/10000)-(DATE1/10000))*365*24*60*60;
    DATE1 = DATE1 - (DATE1/10000)*10000;
    DATE2 = DATE2 - (DATE2/10000)*10000;

    /* Convert months to seconds */
    DELTA = DELTA + (JULIAN[DATE2/100] - JULIAN[DATE1/100])*24*60*60;
    DATE1 = DATE1 - (DATE1/100)*100;
    DATE2 = DATE2 - (DATE2/100)*100;

    /* Finally convert days to seconds */
    DELTA = DELTA + (DATE2 - DATE1)*24*60*60;
  } /* if */
```

```
  /* Convert hours to seconds */
  DELTA = DELTA + ((TIME2/10000)-(TIME1/10000))*60*60;
  TIME1 = TIME1 - (TIME1/10000)*10000;
  TIME2 = TIME2 - (TIME2/10000)*10000;

  /* Convert minutes to seconds */
  DELTA = DELTA + ((TIME2/100)-(TIME1/100))*60;
  TIME1 = TIME1 - (TIME1/100)*100;
  TIME2 = TIME2 - (TIME2/100)*100;

  /* Finally add seconds */
  DELTA = DELTA + TIME2 - TIME1;

  return(DELTA);
} /* E-TIME */


int BUILDTRACK(int N, int ORDER[], struct OB_TYPE O[], int *S, int *F)
/* Given the array O sorted according to array ORDER with N elements,
the starting and ending point for a track is determined and returned in
the pointers S and F */
{
  char *SENSOR;
  long int i,               /* Used for loop control */
           TRACK_DEL_T,     /* The average time between obs for the current track */
           DEL_T;           /* The time between the current two obs being examined */
  long int MAX_T = 180;     /* Longest delta t between obs allowed in a track.
                               Set to 180 in a test with sat #88931 */
  long int MIN_T =  45;     /* Delta T below which obs will automatically be
                               put into the same track. Origonally at 20 sec,
                               I reset to 45 since NAVSPASUR considers tracks
                               within one minute of each other the same track */
  float TOLERANCE = .65;    /* Tolerance limits how much variation is allowed
                               between successive points in a track. Set to
                               .60 to accommodate SAT 770. Reset to .65 to
                               accomadate SAT 88931 */
  char ID_TRACK[7];         /* Satellite number that sensor origonally assigned
                               this observations to */

  (*S) = ++(*F);
  SENSOR = O[ORDER[(*S)]].SENSOR;

  if ((*S) < N-1)
    /* This is a crummy bug fix to handle the last track of a satellite
    that has only one observation. Although BUILDTRACK can handle this
    situation, E_TIME cannot because it chokes on negative delta t's */
    TRACK_DEL_T = E_TIME(O[ORDER[(*S)+1]].DATE, O[ORDER[(*S)+1]].TIME,
                         O[ORDER[(*S)]].DATE, O[ORDER[(*S)]].TIME);
    strcpy(ID_TRACK, O[ORDER[(*S)]].ID_SENSOR);

  for (i=(*S); i+1<N; i++) {
    /* This loop builds tracks of one or more observations. Obs
    are added to the track until one fails to meet the following
    criteria:
      - Ob came from same sensor as rest of obs in track
      - Ob was originally tagged to the same satellite as track
      - The delta t between this ob and the previous one
        is consistent with prior delta t's for this track
      - The delta t is not greater than a maximum given by MAX_T  */
```

```
    if (strcmp(O[ORDER[i+1]].ID_SENSOR, ID_TRACK) == 0 ||
      (atol(O[ORDER[i+1]].ID_SENSOR)>=90000 && atol(ID_TRACK)>= 90000)) {
      /* If the original satellite ID's assigned by the sensor match,
      proceed to compute the delta t. If not, end the track. Must be
      done this way to prevent DEL_T from choking on a negative
      result. Note that an ID of 90000 or greater are all unknowns and
      can be mixed on the same track */
      DEL_T = E_TIME(O[ORDER[i+1]].DATE, O[ORDER[i+1]].TIME,
                     O[ORDER[i]].DATE, O[ORDER[i]].TIME);

      if (DEL_T < MAX_T &&
         ((DEL_T <= (1+TOLERANCE)*TRACK_DEL_T) || (DEL_T<MIN_T)) &&
         ((DEL_T >= (1-TOLERANCE)*TRACK_DEL_T) || (DEL_T<MIN_T))  &&
         strcmp(O[ORDER[i+1]].SENSOR, SENSOR) ==  ) {
        /* If delta t between the two observations is within limits
        and if the same sensor made both observations, proceed*/

/* Following temporarily commented out. System seems to work OK without
   this rule
        if (i+2 < N &&
            (strcmp(O[ORDER[i+2]].ID_SENSOR, ID_TRACK) == 0 ||
            (atol(O[ORDER[i+1]].ID_SENSOR)>=90000 && atol(ID_TRACK)>= 90000)) &&
            strcmp(O[ORDER[i+2]].SENSOR, SENSOR) == 0 &&
            E_TIME(O[ORDER[i+2]], O[ORDER[i+1]]) < .5*TRACK_DEL_T) {
          /* This handles the special case where one track ends and
          another from the same sensor starts. The observation marked
          by i+1 belongs to the second track if it has a smaller
          delta t with that track. Truthfully, I doubt this rule
          ever fires */
/*          break;
        } /* if */

      } else {
        break;
      } /* if */
    } else {
      break;
    } /* if */

  } /* for */

  (*F) = i;
  return(TRUE);
} /* BUILDTRACK */


double ERROR_BETWEEN_TRACKS(double ERROR1, double ERROR2, double OFFSET) {
/* Computes the difference between ERROR1 and ERROR2 then divides by their
average. OFFSET is used in the divisor to scale error values near zero */
  double ERROR;

  ERROR = (ERROR1-ERROR2)/(ERROR1+ERROR2+OFFSET);
  if (ERROR > 1) return(ERROR);
  return(ERROR);
} /* ERROR_BETWEEN_TRACKS */


double NEW_RMS(double RMS1, double RMS2, int POINTS1, int POINTS2) {
/* Given two rms error values, calculates the composite rms value */
  return(sqrt((RMS1*RMS1*POINTS1+RMS2*RMS2*POINTS2)/(POINTS1+POINTS2)));
}; /* NEW_RMS */


double NEW_AVE(double AVE1, double AVE2, int POINTS1, int POINTS2) {
/* Given two averages, computes the composite average */
  return((AVE1*POINTS1+AVE2*POINTS2)/(POINTS1+POINTS2));
}; /* NEW_AVE */
```

```
double DEVIATION(double RMS, double AVE, int POINTS) {
/* Given the RMS and average values for a series of numbers with POINTS
elements, computes the standard deviation */
  if (POINTS == 1) {
    return(0);
  } /* if */
  return(sqrt((RMS*RMS - AVE*AVE)*POINTS/(POINTS-1)));
}; /* DEVIATION */


int MERGE_TRACKS(struct STAT_TYPE *PREVIOUS, struct STAT_TYPE *CURRENT,
                 struct OB_TYPE OB1, struct OB_TYPE OB2) {
/* Examines the statistical data in PREVIOUS and CURRENT to determine
if the two tracks should be merged. Returns TRUE if they were merged with
data in PREVIOUS modified to reflect the new combined track  */

  if (((*PREVIOUS).OBS_IN_TRACK <= 2 || (*CURRENT).OBS_IN_TRACK <= 2) &&
      (strcmp((*PREVIOUS).SENSOR, (*CURRENT).SENSOR) == 0) &&
      (strcmp((*PREVIOUS).ID_SENSOR, (*CURRENT).ID_SENSOR) == 0) &&
      E_TIME(OB2.DATE, OB2.TIME, OB1.DATE, OB1.TIME) < 900) {
      /* Combine short tracks of two or fewer points that are within 15 min
      of each other. Must come from same sensor and have same tag field */

     double U_ERROR, V_ERROR, W_ERROR;
     U_ERROR = ERROR_BETWEEN_TRACKS((*PREVIOUS).Ur, (*CURRENT).Ur, 10.0);
     V_ERROR = ERROR_BETWEEN_TRACKS((*PREVIOUS).Vr, (*CURRENT).Vr, 10.0);
     W_ERROR = ERROR_BETWEEN_TRACKS((*PREVIOUS).Wr, (*CURRENT).Wr, 2.0);
     if (U_ERROR+V_ERROR+W_ERROR < 0.5) {
       /* Error is small enough to justify merging the tracks */

       /* compute new RMS values*/
       (*PREVIOUS).Ur = NEW_RMS((*PREVIOUS).Ur, (*CURRENT).Ur,
                                (*PREVIOUS).OBS_IN_TRACK,
                                (*CURRENT).OBS_IN_TRACK);
       (*PREVIOUS).Vr = NEW_RMS((*PREVIOUS).Vr, (*CURRENT).Vr,
                                (*PREVIOUS).OBS_IN_TRACK,
                                (*CURRENT).OBS_IN_TRACK);
       (*PREVIOUS).Wr = NEW_RMS((*PREVIOUS).Wr, (*CURRENT).Wr,
                                (*PREVIOUS).OBS_IN_TRACK,
                                (*CURRENT).OBS_IN_TRACK);

       /* Compute the new averages */
       (*PREVIOUS).U_ave = NEW_AVE((*PREVIOUS).U_ave, (*CURRENT).U_ave,
                                (*PREVIOUS).OBS_IN_TRACK,
                                (*CURRENT).OBS_IN_TRACK);
       (*PREVIOUS).V_ave = NEW_AVE((*PREVIOUS).V_ave, (*CURRENT).V_ave,
                                (*PREVIOUS).OBS_IN_TRACK,
                                (*CURRENT).OBS_IN_TRACK);
       (*PREVIOUS).W_ave = NEW_AVE((*PREVIOUS).W_ave, (*CURRENT).W_ave,
                                (*PREVIOUS).OBS_IN_TRACK,
                                (*CURRENT).OBS_IN_TRACK);

       (*PREVIOUS).OBS_IN_TRACK = (*PREVIOUS).OBS_IN_TRACK +
                                (*CURRENT).OBS_IN_TRACK;

       (*PREVIOUS).W_OVER_10 = (*PREVIOUS).W_OVER_10 + (*CURRENT).W_OVER_10;

       /* Compute new standard deviations */
       (*PREVIOUS).U_sigma = DEVIATION((*PREVIOUS).Ur,
                                    (*PREVIOUS).U_ave,
                                    (*PREVIOUS).OBS_IN_TRACK);
       (*PREVIOUS).V_sigma = DEVIATION((*PREVIOUS).Vr,
                                    (*PREVIOUS).V_ave,
                                    (*PREVIOUS).OBS_IN_TRACK);
       (*PREVIOUS).W_sigma = DEVIATION((*PREVIOUS).Wr,
                                    (*PREVIOUS).W_ave,
                                    (*PREVIOUS).OBS_IN_TRACK);
```

```
        return(TRUE);
      } /* if */
    } /* if */

    return(FALSE);
}; /* MERGE_TRACKS */


int LOOKUP_GOOD_TRACKS(char *S, char *D, char *T, char *E)
/* A look up table of tracks that the orbital analyst judged as being
good. Specific data is from 14 Feb 92. Returns TRUE for good tracks, FALSE
otherwise */
{
  /* The matrix of good tracks sorted by satellite number, date, time */
  int SIZE = 150;
  int n = 0;
  char KEY[28];

                                /* SAT  DATE    TIME        SENSOR */
  char GOOD_TRACKS[][27]   =   {
                "100 920211 061511.19 221",
                "101 920211 061511.19 221",
                "102 920211 061511.19 221",
                "103 920211 061511.19 221",
                "104 920211 061511.19 221",
                "105 920211 061511.19 221",
                "106 920211 061511.19 221",
                "107 920211 061511.19 221",
                "108 920211 061511.19 221",
  /* F.H. */    "2865 920211 041558.43 369",
  /* F.H. */    "3899 920116 052633.12 396",
  /* F. H. */   "4637 920211 061511.19 396",
                "7324 920210 223733.02 242",
                "8513 920210 224108.97 242",
  /* F.H. */    "8547 920211 165652.54 334",
  /* F.H. */   "10617 920211 182910.50 396",
  /* F.H. */   "11332 920211 091102.01 396",
  /* F.H. */   "13464 920211 065548.75 396",
               "14362 920211 020456.34 396",
               "14362 920211 124613.90 399",
               "14783 920210 223052.30 242",
               "14783 920210 223358.66 242",
               "15390 920203 094258.60 398",
               "15390 920204 143150.82 398",
               "15390 920204 220712.12 398",
               "15390 920205 025047.47 398",
               "15390 920205 120903.59 398",
               "15390 920206 050941.81 398",
               "15390 920206 094834.08 398",
               "15390 920206 142622.62 398",
               "15390 920207 072808.50 398",
               "15390 920207 072904.82 398",
               "15390 920207 072943.26 398",
               "15390 920207 120331.15 398",
               "15390 920208 050436.75 398",
               "15390 920208 094258.60 398",
               "15390 920208 215222.16 398",
               "15390 920209 023657.23 398",
               "15390 920209 072238.54 398",
               "15390 920209 115754.19 398",
               "15390 920209 120409.88 398",
               "15390 920209 120544.80 398",
               "15390 920210 045915.51 398",
               "15390 920210 093716.01 398",
  /* F.H. */   "15758 920211 104746.33 396",
  /* F.H. */   "17253 920114 103256.76 334",
  /* F.H. */   "17253 920114 105051.82 334",
```

```
                "18601 920211 051519.34 399",
/* F.H. */      "18955 920211 065624.74 396",
/* F.H. */      "19111 920211 195216.51 396",
/* F.H. */      "19437 920211 064921.49 396",
                "19994 920201 222215.38 399",
                "19994 920203 220516.73 399",
                "19994 920204 215559.39 399",
                "19994 920205 214636.98 399",
                "20171 920211 090347.41 385",
                "20171 920211 090645.29 385",
                "20596 920211 113638.66 385",
                "20596 920211 113849.79 382",
                "20672 920201 114236.23 398",
                "20946 920211 085933.98 951",
                "20947 920211 080512.09 399",
                "21058 920211 060621.80 399",
                "21223 920211 144226.11 383",
/* F.H. */      "21538 920207 071500.69 334",
                "21692 920114 201731.99 398",
                "21764 920211 002941.04 329",
/* F.H. */      "21854 920211 022437.88 369",
/* F.H. */      "21854 920211 030327.21 369",
/* F.H. */      "21854 920211 030916.93 369",
/* F.H. */      "21854 920211 035325.95 369",
/* F.H. */      "21854 920211 041331.80 404",
/* F.H. */      "21854 920211 050100.73 369",
                "21854 920211 174937.89 399",
                "21855 920211 023724.93 369",
                "21855 920211 052003.77 369",
                "21855 920211 021948.96 399",
                "21855 920211 023045.83 399",
                "21855 920211 023942.32 399",
                "87117 920211 000946.59 399",
                "87117 920211 104520.79 399",
                "87117 920211 104551.42 399",
                "87117 920211 141607.67 399",
                "87153 920211 175600.24 396",
                "87153 920211 041108.28 399",
/* F.H. */      "87272 920211 194016.37 396",
/* F.H. */      "87302 920120 125531.79 396",
/* F.H. */      "87302 920121 021310.78 396",
/* F.H. */      "87302 920122 023430.37 396",
/* F.H. */      "87302 920122 120013.03 396",
/* F.H. */      "87302 920124 123825.29 396",
                "87332 920211 125447.90 393",
                "87336 920211 095954.57 396",
                "87356 920211 130900.40 393",
                "87365 920211 100130.79 396",
                "87373 920211 061147.69 396",
                "87376 920211 182446.10 393",
                "87869 920211 012726.24 396",
                "87869 920211 220531.05 399",
                "88032 920131 233733.43 398",
                "88048 920127 004924.94 398",
                "88048 920130 013501.19 398",
                "88072 920202 124621.80 398",
                "88075 920210 235311.23 399",
                "88079 920204 110819.68 398",
                "88079 920205 130417.49 398",
                "88079 920205 183534.10 398",
                "88079 920206 145927.72 398",
                "88079 920207 112808.80 398",
                "88079 920207 165639.68 398",
                "88079 920208 132305.70 398",
                "88079 920209 095244.27 398",
                "88079 920209 151846.06 398",
                "88079 920210 114604.06 398",
```

```
               "88079 920211 134139.59 398",
               "88079 920214 150321.55 398",
               "88079 920211 145927.72 398",
               "88079 920211 080906.00 399",
               "88079 920211 134139.59 399",
               "88079 920211 134324.21 399",
               "88108 920210 211716.37 221",
               "88108 920211 185826.02 243",
               "88112 920211 141612.28 221",
               "88114 920211 144608.40 221",
               "88117 920211 064649.66 231",
               "88120 920211 104534.61 399",
               "88446 920211 135416.12 399",
/* F.H. */     "88629 920211 123620.44 334",
/* F.H. */     "88769 920211 124356.87 334",
               "88788 920129 235105.84 398",
               "88788 920131 052028.33 398",
               "88788 920201 003122.15 398",
               "88838 920211 092047.21 232",
               "88850 920211 025439.64 383",
/* F.H. */     "88856 920211 000143.45 399",
               "88892 920126 220010.21 398",
               "88892 920128 232902.17 398",
               "88892 920206 213722.87 398",
               "88893 920119 025118.25 398",
               "88893 920121 012227.11 398",
               "88893 920123 042117.61 398",
               "88893 920123 042305.72 398",
               "88893 920124 012108.74 398",
               "88893 920127 011746.77 398",
               "88893 920127 031818.20 398",
               "88917 920202 020730.47 398",
               "88917 920202 020649.86 399",
               "88917 920211 223247.69 385",
               "88917 920211 223258.96 399",
               "88931 920211 201906.84 383"
            /* "00000 YYMMDD 000000.00 000", */ };

  /* Build the search key */
  strcpy(KEY,S);
  strcat(KEY," ");
  strcat(KEY, D);
  strcat(KEY," ");
  strcat(KEY, T);
  strcat(KEY," ");
  strcat(KEY, E);
  /* Clip off the new line character that comes with the E field */
  KEY[strlen(KEY)-1] = '\0';

  /* Conduct search */
  while ((n<SIZE) && (strcmp(GOOD_TRACKS[n], KEY) != 0)) n++;

  /* See if match was found */
  if ((n< SIZE) && (strcmp(GOOD_TRACKS[n], KEY) == 0))
   return(TRUE);

  /* If no match, return false */
  return(FALSE);
} /* LOOKUP_GOOD_TRACKS */
```

```
int STATS(int ORDER[], struct OB_TYPE O[], int S, int F,
        struct SAT_TYPE SAT, struct STAT_TYPE *DATA)
/* Computes the statistical data for a track given by the elements of O
starting at S and ending at F inclusive. */
{
  int i;
  struct OB_TYPE CUR_OB;

  /* Initialize cumulative fields */
  (*DATA).W_OVER_10 = 0.0;
  (*DATA).Ur = 0.0;
  (*DATA).Vr = 0.0;
  (*DATA).Wr = 0.0;
  (*DATA).U_ave = 0;
  (*DATA).V_ave = 0;
  (*DATA).W_ave = 0;

  for (i=S; i <= F; i++) {

    /* Add up cumulitive fields */
    CUR_OB = O[ORDER[i]];

    if (abs(atoi(CUR_OB.W)) >= 10) {
      (*DATA).W_OVER_10 = (*DATA).W_OVER_10+1.0;
    } /* if */

    (*DATA).Ur = (*DATA).Ur + pow(atol(CUR_OB.U), 2);
    (*DATA).Vr = (*DATA).Vr + pow(atol(CUR_OB.V), 2);
    (*DATA).Wr = (*DATA).Wr + pow(atol(CUR_OB.W), 2);
    (*DATA).U_ave = (*DATA).U_ave + atol(CUR_OB.U);
    (*DATA).V_ave = (*DATA).V_ave + atol(CUR_OB.V);
    (*DATA).W_ave = (*DATA).W_ave + atol(CUR_OB.W);
  } /* for */

  /* Compute number of obs in track */
  (*DATA).OBS_IN_TRACK = (F-S+1);

  /* Compute the averages */
  (*DATA).U_ave = (*DATA).U_ave/(*DATA).OBS_IN_TRACK;
  (*DATA).V_ave = (*DATA).V_ave/(*DATA).OBS_IN_TRACK;
  (*DATA).W_ave = (*DATA).W_ave/(*DATA).OBS_IN_TRACK;

  /* Compute the rms values for the errors */
  (*DATA).Ur = sqrt((*DATA).Ur/(*DATA).OBS_IN_TRACK);
  (*DATA).Vr = sqrt((*DATA).Vr/(*DATA).OBS_IN_TRACK);
  (*DATA).Wr = sqrt((*DATA).Wr/(*DATA).OBS_IN_TRACK);

  /* Compute the standard deviations */
  (*DATA).U_sigma = DEVIATION((*DATA).Ur, (*DATA).U_ave, (*DATA).OBS_IN_TRACK);
  (*DATA).V_sigma = DEVIATION((*DATA).Vr, (*DATA).V_ave, (*DATA).OBS_IN_TRACK);
  (*DATA).W_sigma = DEVIATION((*DATA).Wr, (*DATA).W_ave, (*DATA).OBS_IN_TRACK);

  /* Copy the drag */
  (*DATA).DRAG = atof(SAT.DRAG);

  /* Copy the period */
  (*DATA).PERIOD = atof(SAT.PERIOD);

  /* Look up the experts opinion on whether a track is good or not */
  (*DATA).GOOD_TRACK = LOOKUP_GOOD_TRACKS(SAT.ID_SID,
                                          O[ORDER[S]].DATE,
                                          O[ORDER[S]].TIME,
                                          O[ORDER[S]].SENSOR);
  (*DATA).BAD_TRACK = (!(*DATA).GOOD_TRACK);
```

```
  /* Compute the julian date of the track and it's age compared to the
  elset epoch */
  (*DATA).JULIAN = JULIAN(O[ORDER[S]].DATE);
  (*DATA).AGE = E_TIME(O[ORDER[S]].DATE, O[ORDER[S]].TIME,
                       SAT.ELSET_EPOCH, "235959.99")/86400;

  /* Finally, record the SENSOR, ID_SENSOR, and ID_SID fields for possible
  use by the COMPARE_TRACKS routine */
  strcpy((*DATA).SENSOR, O[ORDER[S]].SENSOR);
  strcpy((*DATA).ID_SENSOR, O[ORDER[S]].ID_SENSOR);
  strcpy((*DATA).ID_SID, SAT.ID_SID);

  return(TRUE);
} /* STATS */


int FUZZY(struct STAT_TYPE *DATA, struct FUZZY_TYPE *F)
/* Maps selected data from SAT and DATA into fuzzy sets for use by the
evaluator function. All mappings have a range from 0 to 1 indicating degree
of set membership */
{
  float RMS;

  /* Number of obs in each track. Membership criteria: This track has lots
  of obs. */
  if ((*DATA).OBS_IN_TRACK > 6) {
    (*F).OBS_IN_TRACK = 1.0;
  } else {
    (*F).OBS_IN_TRACK = ((*DATA).OBS_IN_TRACK-1)/5.0;
  } /* if */

  /* Drag. Membership criteria: This satellite is experiencing high drag */
  (*F).DRAG = (*DATA).DRAG;

  if ((*F).DRAG < 0.0) {
    (*F).DRAG = 1.0 + log10(-(*F).DRAG)/4.0;
    if ((*F).DRAG > 1.0) {
      /* Satellite drag is greater than -1.0000. Set to 1.0000 */
      (*F).DRAG = 1.0;
    }; /* if */
  } else {
    /* Satellite has positive or no drag. Set to same as .0001 drag */
    (*F).DRAG = 0.00;
  } /* if */
```

```
/* RMS errors for the U, V, W axis. Membership criteria: This error is
small. Use seperate rules for scaling the error for single point
and multi-point tracks */
if ((*DATA).OBS_IN_TRACK == 1) {

  /* Clip and scale the 1 ob tracks values*/
  if ((*DATA).Ur > 25.0) {
    (*F).Ur = 0.0;
  } else {
    (*F).Ur = 1.0 - (*DATA).Ur/25.0;
  } /* if */

  if ((*DATA).Vr > 30.0) {
     (*F).Vr = 0.0;
  } else {
     (*F).Vr = 1.0 - (*DATA).Vr/30.0;
  } /* if */

  if ((*DATA).Wr > 13.0) {
     (*F).Wr = 0.0;
  } else {
     (*F).Wr = 1.0 - (*DATA).Wr/13.0;
  } /* if */

} else {
  /* For multi-point tracks, scale RMS values for U and V by satellite
  period and drag */
  (*F).Ur = (*DATA).Ur*pow((*DATA).PERIOD, -.500);
  (*F).Vr = (*DATA).Vr*pow((*DATA).PERIOD, -.500);
  (*F).Wr = (*DATA).Wr;

  /* Scale the errors by DRAG. Higher drag yields greater error tolerance */
  if ((*F).DRAG > .25) {
    (*F).Ur = (*F).Ur/(1+0.8*(*F).DRAG);
    (*F).Vr = (*F).Vr/(1+1.0*(*F).DRAG);
    (*F).Wr = (*F).Wr/(1+0.4*(*F).DRAG);
  } /* if */

  /* Clip and scale the RMS values*/
  if ((*F).Ur > 15.0) {
     (*F).Ur = 0.0;
  } else {
     (*F).Ur = 1.0 - (*F).Ur/15.0;
  } /* if */

  if ((*F).Vr > 30.0) {
     (*F).Vr = 0.0;
  } else {
     (*F).Vr = 1.0 - (*F).Vr/30.0;
  } /* if */

  if ((*F).Wr > 13.0) {
     (*F).Wr = 0.0;
  } else {
     (*F).Wr = 1.0 - (*F).Wr/13.0;
  } /* if */
} /* if */

/* W>10. Membership criteria: This track has few W errors greater than 10 */
(*F).W_OVER_10 = 1.0 - (*DATA).W_OVER_10/(*DATA).OBS_IN_TRACK;

/* ID. Membership criteria: Origonal sensor tag is the same as current
satellite */
(*F).ID_MATCH = !(strcmp((*DATA).ID_SID, (*DATA).ID_SENSOR));

/* Copy the good and bad track data from the expert */
(*F).GOOD_TRACK = (*DATA).GOOD_TRACK;
```

```
  (*F).BAD_TRACK = (*DATA).BAD_TRACK;

  return(TRUE);
} /* FUZZY */

} /* STATS */
```

```
/****************************************************************************/
/*                                                                          */
/*  FILE:      IO.C                                                         */
/*  SYSTEM:    PC                                                           */
/*  COMPILER:  Borland ANSI C                                               */
/*  LAST MOD:  22 June 92                                                   */
/*  PURPOSE:   Input/output routines. Only one of the output files is      */
/*             actually used by CLIPS, the TRACKS file. Others are produced */
/*             for debugging purposes                                       */
/*                                                                          */
/****************************************************************************/

#include <STRING.H>
#include <STDLIB.H>
#include <MATH.H>
#include "IO.H"
#include "EVALUATE.H"

/* Global file names */
FILE *IN, *OUT, *STATSFILE, *TRACKSFILE;

int OPENFILES(void)
/* Opens the global files IN, OUT, and STATS. Returns TRUE on success,
otherwise terminates the program */
{
  /* open the input file */
  if ((IN = fopen("\CLEAN","rt")) == NULL) {
    printf("Error opening file CLEAN");
    exit(1);
  } /* if */

  /* open the debugging output file */
  if ((OUT = fopen("\SORTED","wt")) == NULL){
    printf("Error opening file SORTED");
    exit(1);
  }; /* if */

  /* open the debugging statistics files */
  if ((STATSFILE = fopen("\STATS","wt")) == NULL){
    printf("Error opening file STATS");
    exit(1);
  }; /* if */

  /* open the results files for CLIPS*/
  if ((TRACKSFILE = fopen("\TRACKS","wt")) == NULL){
    printf("Error opening file RESULTS");
    exit(1);
  }; /* if */

  return(1);
} /* OPENFILES */


int CLOSEFILES(void)
/* Closes all data files */
{
  fclose(IN);
  fclose(OUT);
  fclose(STATSFILE);

  return(1);
} /* CLOSEFILES */
```

```
int GETSAT(char *SAT_STR, struct SAT_TYPE *S)
/* Reads a line from file IN, writes it to OUT, tokenizes it, and stores
results in variable pointed at by S. Returns 0 if blank line encountered,
1 if results successful, and terminates program on input error */
{
  int ERROR = FALSE;
  char S_STR[81];

  /* Read in a line */
  if (strlen(fgets(S_STR, 80, IN)) > 1) {

    strcpy(SAT_STR, S_STR);
    /* Tokenize the string if it is not empty (ie, length < 1) */
    strcpy((*S).ID_SID, strtok(S_STR, " ")); ERROR = ERROR + !((*S).ID_SID);
    strcpy((*S).INCLINATION,strtok('\0'," "));ERROR=ERROR+!((*S).INCLINATION);
    strcpy((*S).PERIOD , strtok('\0', " ")); ERROR = ERROR + !((*S).PERIOD);
    strcpy((*S).DRAG, strtok('\0', " ")); ERROR = ERROR + !((*S).DRAG);
    strcpy((*S).DESIG1, strtok('\0', " ")); ERROR = ERROR + !((*S).DESIG1);
    strcpy((*S).DESIG2, strtok('\0', " ")); ERROR = ERROR + !((*S).DESIG2);
    strcpy((*S).DESIG3, strtok('\0', " ")); ERROR = ERROR + !((*S).DESIG3);
    strcpy((*S).RA , strtok('\0', " ")); ERROR = ERROR + !((*S).RA);
    strcpy((*S).ELSET_EPOCH,strtok('\0'," "));ERROR=ERROR+!((*S).ELSET_EPOCH);

    if (ERROR) {
      printf("Error while reading clean satellite data, satellite %li\n",
             (*S).ID_SID);
      exit(0);
    } /* if */

  } else {
    /* Must be end of file */
    return(0);

  } /* if */

  /* Process successful */
  return(1);
} /* GETSAT */

int PUTSAT(char *S_STR)
/* Writes the string S_STR to the file OUT and STATSFILE. Returns non-negitive
number on success, else returns a value equal to EOF */
{
  fprintf(STATSFILE, "\n");
  fputs("!", STATSFILE);
  fputs(S_STR, STATSFILE);
  return(fputs(S_STR, OUT));
} /* PUTSAT */


int GETOBS(struct OB_TYPE OB[])
/* Continually reads lines of data from file IN and stores results in array
OB. If successful, returns number of lines read. On array overflow, terminates
program. On input error, returns 0 */
{
  char OBS_STR[81];
  int ERROR = FALSE;
  int i = 0;

  while (strlen(fgets(OBS_STR, 81, IN)) > 1) {
    /* Tokenize the string if it isn't empty (ie, it has length > 1) */
    strcpy(OB[i].DATE, strtok(OBS_STR, " ")); ERROR = ERROR + !(OB[i].DATE);
    strcpy(OB[i].TIME, strtok('\0', " ")); ERROR = ERROR + !(OB[i].TIME);
    strcpy(OB[i].ALTITUDE,strtok('\0', " "));ERROR=ERROR+!(OB[i].ALTITUDE);
    strcpy(OB[i].U, strtok('\0', " ")); ERROR = ERROR + !(OB[i].U);
    strcpy(OB[i].V, strtok('\0', " ")); ERROR = ERROR + !(OB[i].V);
```

```
    strcpy(OB[i].W, strtok('\0', " ")); ERROR = ERROR + !(OB[i].W);
    strcpy(OB[i].ID_SENSOR, strtok('\0', " "));ERROR=ERROR+!(OB[i].ID_SENSOR);
    strcpy(OB[i].SENSOR, strtok('\0', " ")); ERROR = ERROR + !(OB[i].SENSOR);

    if (++i >= MAX_OBS) {
      printf("Array overflow while reading in clean observation data");
      exit(0);
    } /* if */

  }; /* while */

  if (ERROR) {
    return(0);
  } else {
    return(i);
  } /* if */

} /* GETOBS */


int PUTOB(struct OB_TYPE OB)
/* Prints OB to file OUT. Note that a new line character (\n) is
 automatically inserted since it is part of token SENSOR. */
{
  fprintf( OUT, "%15s", OB.DATE);
  fprintf( OUT, "%11s", OB.TIME);
  fprintf( OUT, "%7s", OB.ALTITUDE);
  fprintf( OUT, "%8s", OB.U);
  fprintf( OUT, "%8s", OB.V);
  fprintf( OUT, "%8s", OB.W);
  fprintf( OUT, "%7s", OB.ID_SENSOR);
  fprintf( OUT, "%5s", OB.SENSOR);
  return(0);
} /* PUTOB */

int PUTSTATS(FILE *FNAME, struct FUZZY_TYPE DATA) {
/* Writes the information stored in DATA to specified file FNAME*/

  fprintf(FNAME, "%11.2f", DATA.OBS_IN_TRACK);
  fprintf(FNAME, "%5.2f", DATA.W_OVER_10);
  fprintf(FNAME, "%8.2f", DATA.DRAG);
  fprintf(FNAME, "%16.2f", DATA.Ur);
  fprintf(FNAME, "%7.2f", DATA.Vr);
  fprintf(FNAME, "%7.2f", DATA.Wr);
  fprintf(FNAME, "%3i", DATA.ID_MATCH);
  fprintf(FNAME, "%3i", DATA.GOOD_TRACK);
  fprintf(FNAME, "%3i\n", DATA.BAD_TRACK);

  return(1);
} /* PUTSTATS */

int PUTRANK(int ORDER[], struct OB_TYPE O[], int S,
            struct STAT_TYPE DATA, struct FUZZY_TYPE FDATA, float RANK,
            char SAT[])
/* Writes the rank, statistical data, track data, and satellite number
to output file TRACKS. Percentages are used so that CLIPS only has to
handle integers, not floats */
{
  char SENSOR[4] = "";
  char HOUR[3] = "";

  strncat(SENSOR, O[ORDER[S]].SENSOR, 3);
  strncat(HOUR, O[ORDER[S]].TIME, 2);

  fprintf(TRACKSFILE, "(track (satellite \"%5s\")", SAT);
  fprintf(TRACKSFILE, "(sensor %s)", SENSOR);
  fprintf(TRACKSFILE, "(id_sensor \"%5s\")", DATA.ID_SENSOR);
```

```
  fprintf(TRACKSFILE, "(epoch \"%s %s\")", O[ORDER[S]].DATE, O[ORDER[S]].TIME);
  fprintf(TRACKSFILE, "(julian %i)", DATA.JULIAN);
  fprintf(TRACKSFILE, "(age %3i)", DATA.AGE);
  fprintf(TRACKSFILE, "(hour %s)", HOUR);
  fprintf(TRACKSFILE, "(points %3.0f)", 100*FDATA.OBS_IN_TRACK);
  fprintf(TRACKSFILE, "(u %3.0f)", 100*FDATA.Ur);
  fprintf(TRACKSFILE, "(v %3.0f)", 100*FDATA.Vr);
  fprintf(TRACKSFILE, "(w %3.0f)", 100*FDATA.Wr);
  fprintf(TRACKSFILE, "(u_sigma %3.0f)", DATA.U_sigma/10);
  fprintf(TRACKSFILE, "(v_sigma %3.0f)", DATA.V_sigma/10);
  fprintf(TRACKSFILE, "(w_sigma %3.0f)", DATA.W_sigma/10);
  fprintf(TRACKSFILE, "(w>10 %3.0f)", 100*FDATA.W_OVER_10);
  fprintf(TRACKSFILE, "(id %3i)", 100*FDATA.ID_MATCH);
  fprintf(TRACKSFILE, "(rank %3.0f)", 100*RANK);

  if (FDATA.GOOD_TRACK) {
    /* Expert thought this was a good track */
    fprintf(TRACKSFILE, "(expert %3s))\n", "YES");
  } else {
    fprintf(TRACKSFILE, "(expert %3s))\n", "NO");
  } /* if */

  return(1);
} /* PUTRANK */


int PUTTRACK(int ORDER[], struct OB_TYPE O[], int S, int F,
             struct FUZZY_TYPE DATA)
/* Writes the observations and statistical data for the track starting at
S and ending at F to the output file for use by CLIPS */
{
  int i;

  for (i=S; i<=F; i++) {
    PUTOB(O[ORDER[i]]);
  } /* for */

  /* Write the statistical data to both the OUT and STATSFILE files */
  PUTSTATS(OUT, DATA);
  PUTSTATS(STATSFILE, DATA);
  fprintf(OUT, "\n");

  return(1);
} /* PUTTRACK */
```

```
/****************************************************************************/
/*                                                                          */
/*  FILE:       EVALUATE.C                                                  */
/*  SYSTEM:     PC                                                          */
/*  COMPILER:   Borland ANSI C                                              */
/*  LAST MOD:   21 Nov 92                                                   */
/*  PURPOSE:    Computes the rank of a given track using fuzzy set theory.  */
/*              Rank is based on evaluation function that uses a feature    */
/*              set that has been mapped to the range (0,1) using           */
/*              fuzzy set memberships                                       */
/****************************************************************************/
#include <STDLIB.H>
#include <STDIO.H>
#include <MATH.H>


float EVALUATE(float POINTS,
              float W_OVER_10,
              double Ur,
              double Vr,
              double Wr,
              int ID_MATCH
) {
/* Performs a fuzzy logic evaluation of a track by examining how well it
fits the characteristics of the two types of tracks: those that should be
accepted and those that should be rejected. ACCEPT and REJECT are the set
membership functions. In there present form they produce values from 0 to
1.943; scaling could map them to 0 to 1 values, but here that scaling is
handled in the RANK calculations. RANK is based on the difference between
the two membership functions. That delta can have a range from d_min to
d_max. The actual delta is divided by the maximum to get a rank from 0 to 1.
This rank represents the possibility that the given track is a good one */
  float ACCEPT, REJECT;
  float d_min = -.748;
  float d_max =  .647;

  ACCEPT = sqrt(pow((.6411-POINTS),2) + pow((1.0214-W_OVER_10),2) +
                pow((.8364-Ur),2) + pow((.7368-Vr),2) +
                pow((.8866-Wr),2) + pow((.4603-ID_MATCH),2));

  REJECT = sqrt(pow((.3118-POINTS),2) + pow((0.6962-W_OVER_10),2) +
                pow((.6942-Ur),2) + pow((.4871-Vr),2) +
                pow((.4636-Wr),2) + pow((.1754-ID_MATCH),2));

  return((REJECT-ACCEPT-d_min)/(d_max-d_min));
} /* EVALUATE */
```

```
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
; TITLE:    EVALUATE.CLP                                                       ;
; AUTHOR:   Mike Hecker                                                        ;
; DATE:     23 Sep 92                                                          ;
; PURPOSE:  An expert system that catagorizes satellite tracks                 ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

(deftemplate track
     (field satellite   (type             STRING))
     (field sensor      (type             INTEGER))
     (field id_sensor   (type             STRING))
     (field epoch       (type             STRING))
     (field julian      (type             INTEGER))
     (field age         (type             INTEGER))
     (field hour        (type             INTEGER))
     (field points      (type             INTEGER))
     (field u           (type             INTEGER))
     (field v           (type             INTEGER))
     (field w           (type             INTEGER))
     (field u_sigma     (type             INTEGER))
     (field v_sigma     (type             INTEGER))
     (field w_sigma     (type             INTEGER))
     (field w>10        (type             INTEGER))
     (field id          (type             INTEGER))
     (field rank        (type             INTEGER))
     (field expert      (type             SYMBOL)
                        (allowed-symbols YES NO))
     (field fh          (type             SYMBOL)
                        (allowed-symbols T F)
                        (default          F))
     (field old_epoch   (type             SYMBOL)
                        (allowed-symbols T F)
                        (default          F))
     (field sigma       (type             SYMBOL)
                        (allowed-symbols T F)
                        (default          F))
     (field halo        (type             SYMBOL)
                        (allowed-symbols T F)
                        (default          F))
) ;DEFTEMPLATE TRACK

(deftemplate sensor
     (field id_number   (type             INTEGER))
     (field reliability (type             SYMBOL)
                        (allowed-symbols GOOD BAD))
); DEFTEMPLATE SENSOR

(deftemplate flags
     (field front_half  (type             SYMBOL)
                        (allowed-symbols T F)
                        (default          F))
     (field bad_sensor  (type             SYMBOL)
                        (allowed-symbols T F)
                        (default          F))
     (field old_epoch   (type             SYMBOL)
                        (allowed-symbols T F)
                        (default          F))
     (field sigma       (type             SYMBOL)
                        (allowed-symbols T F)
                        (default          F))
     (field halo        (type             SYMBOL)
                        (allowed-symbols T F)
                        (default          F))
     (field print       (type             SYMBOL)
                        (allowed-symbols T F)
                        (default          F))
);flags
```

```
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                              INITIAL FACTS                                   ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

(deffacts sensors
     ;Similar facts determine which sensors are from the same ground facility.
     ;They are asserted as pairs here. A more elogent and general solution
     ;would use multi-value fields
     (sensor (id_number 334) (reliability GOOD))
     (sensor (id_number 369) (reliability GOOD))
     (sensor (id_number 396) (reliability GOOD))
     (sensor (id_number 404) (reliability GOOD))
     (sensor (id_number 329) (reliability BAD))
     (similar 241 241)
     (similar 242 242)
     (similar 243 243)
     (similar 398 398)
     (similar 399 399)
     (similar 243 242)
     (similar 241 242)
     (similar 242 241)
     (similar 242 243)
     (similar 243 242)
     (similar 241 243)
     (similar 243 241)
     (similar 399 398)
     (similar 398 399)
);sensors

(deffacts globals
     (flags)
);globals

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                        FUNCTIONS AND SYSTEM RULES                            ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

(deffunction approximately_equal (?A ?B ?TOLERANCE)
    ;Returns true if A is within TOLERANCE percent of B
    (and (< ?A (* ?B (+ 1 ?TOLERANCE))) (> ?A (* ?B (- 1 ?TOLERANCE))))
); approximately_equal

(deffunction unknown (?ID)
    ;Returns true if ?ID is an unknown observation, ie, a tag > 90000
    (and (eq (str-length ?ID) 5) (> (str-compare ?ID "90000") 0) )
); unknown

(defrule load_stats
    (declare (salience 1000))
    (initial-fact)
   ?FLAGS <- (flags (bad_sensor F))
    =>
    (load-facts tracks)
    (modify ?FLAGS (bad_sensor T))
);load_stats

(defrule activate_old_epoch
   ;This rule suppresses firing of the old_epoch rule until all bad_sensor rules
   ;are off the agenda. Controls memory usage and enhances speed
   (declare (salience 805))
   ?FLAGS <- (flags (old_epoch F))
   =>
   (modify ?FLAGS (old_epoch T))
);activate_old_epoch
```

```
(defrule activate_too_much_variation
   ;This rule suppresses firing of the too_much_variation rule until all higher salience rules
   ;are off the agenda. Controls memory usage and enhances speed
   (declare (salience 855))
   ?FLAGS <- (flags (sigma F))
   ->
   (modify ?FLAGS (sigma T))
);activate_old_epoch

(defrule activate_halo
   ;This rule suppresses firing of the rule until all higher salience rules
   ;are off the agenda. Controls memory usage and enhances speed
   (declare (salience 705))
   ?FLAGS <- (flags (halo F))
   ->
   (modify ?FLAGS (halo T))
);activate_halo

(defrule activate_front_half
   ;This rule suppresses firing of the front_half rule until all old_epoch rules
   ;are off the agenda. Controls memory usage and enhances speed
   (declare (salience 605))
   ?FLAGS <- (flags (front_half F))
   ->
   (modify ?FLAGS (front_half T))
);activate_front_half

(defrule activate_print
   ;This rule suppresses firing of the printing rules until all old_epoch rules
   ;are off the agenda. Controls memory usage and enhances speed
   (declare (salience 25))
   ?FLAGS <- (flags (print F))
   ->
   (modify ?FLAGS (print T))
);activate_printing

(defrule print_header
    (declare (salience 20))
    (flags (print T))
    =>
    (open "RANKING" r "w")
    (printout r "SAT    SNSR DATE    TIME        OBS   U     V    W W>10 FH HALO AGE SIG  ID RANK
EXPERT" crlf)
);print_header

(defrule print_ranking
    (declare (salience 10))
    (flags (print T))
    ?F <- (track (rank ?RANK_HIGHEST)(satellite ?SAT)(sensor ?SENSOR)(epoch ?EPOCH)
                 (points ?P)(u ?U)(v ?V)(w ?W)(w>10 ?W>10)(id ?ID)(expert ?E)
                 (old_epoch ?A)(fh ?FH)(halo ?HALO)(sigma ?SIGMA))
    (not (track (rank ?RANK&:(> ?RANK ?RANK_HIGHEST))))
    (not (track (rank ?R&:(eq ?R ?RANK_HIGHEST))(satellite ?S&:(< (str-compare ?S ?SAT) 0))))
    =>
    (format r "%-6s %-4d %-16s %4d %4d %4d %4d %4d %2s %4s %3s %3s %3d %4d %6s"
              ?SAT ?SENSOR ?EPOCH ?P  ?U  ?V  ?W  ?W>10 ?FH ?HALO ?A ?SIGMA  ?ID ?RANK_HIGHEST ?E)
    (printout r crlf)
    (retract ?F)
);print_ranking

(defrule quit
    (declare (salience 0))
    (not (track))
    =>
    (close)
);quit
```

```
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                              EVALUATION  RULES                                ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

(defrule bad_sensor
   (declare (salience 900))
   ;Reduce rankings for tracks from unreliable sensors. The amount of reduction is 10% here,
  ;but that number needs to be verified. Not enough data available to date to really test it
   (flags (bad_sensor T))
   (sensor (reliability ?RELIABLE&:(eq ?RELIABLE BAD))(id_number ?S_BAD))
   ?F <- (track (sensor ?S&:(eq ?S ?S_BAD))(fh ?FH&:(eq ?FH F))(rank ?R))
   =>
   (bind ?R (max (- ?R 10) 0))
   (modify ?F (rank ?R)(fh T))
);bad_sensor

(defrule too_much_variation
   ;Reduces ranking for tracks with u or v errors that vary too much. Variance is measured
   ;through standard deviation recorded in fields u_sigma and v_sigma.
   (declare (salience 850))
   (flags (sigma T))
   ?F <- (track (u_sigma ?U) (v_sigma ?V) (sigma ?S&:(eq ?S F)) (rank ?R))
   (test (or (> ?V 10) (> ?U 10)))
   =>
   (bind ?DELTA (max (* (- ?U 10) 5) (* (- ?V 10) 5)) )
   (bind ?DELTA (min ?DELTA 30))
   (bind ?R (max (- ?R ?DELTA) 0))
   (modify ?F (rank ?R) (sigma T))
);too_much_variation

(defrule old_epoch
   ;Reduces or improves ranking for tracks whose epoch is older/younger than the epoch of
   ;the elset. Formula is to change for every day past 2 days old for a maximum of 26%
   ;change
   (declare (salience 800))
   (flags (old_epoch T))
   ?F <- (track (age ?AGE&:(> (abs ?AGE) 2)) (points ?P&:(neq ?P 0)) (old_epoch ?E&:(eq ?E F))
                (rank ?R))
   =>
   (bind ?DELTA (min (* (- (abs ?AGE) 2) 6) 26))
   (if (< ?AGE 0) then
     (bind ?R (max (- ?R ?DELTA) 0))
   else
     (bind ?R (min (+ ?R ?DELTA) 99))
   );if
   (modify ?F (rank ?R)(old_epoch T))
);old_epoch

(defrule halo-short_track
   (declare (salience 700))
   ;Advance rankings for 1-2 point tracks that are close in time to good tracks. Ranking of
   ;short track is set equal to longer if
   ;    - Obs came from same sensor
   ;    - The longer track has at least 3 points
   ;    - The u, v, w errors are approximately the same
   ;    - The tracks are within an hour of each other. This should be refined as better
   ;      epoch data is passed to CLIPS from C code routines
   ?FLAGS <- (flags (halo T))
   ?F <- (track (points ?P&:(< ?P 21))(julian ?J)(satellite ?SAT)(sensor ?S)(rank ?R)
                (hour ?H) (w ?W) )
   (track (satellite ?SAT2&:(eq ?SAT2 ?SAT))(sensor ?S2&:(eq ?S2 ?S))(points ?P2&:(> ?P2 20))
          (hour ?H2&:(< (abs (- ?H2 ?H)) 1))(julian ?J2&:(eq ?J2 ?J))(rank ?R2&:(> ?R2 ?R))
          (w ?W2&:(approximately_equal ?W ?W2 .10)) )
   (not (track (julian ?J)(satellite ?SAT)(sensor ?S)(rank ?R3&:(> ?R3 ?R2))))
   =>
   (modify ?F (rank ?R2)(halo T))
);halo-short_track
```

```
(defrule halo-single_point_track
   (declare (salience 700))
   ;Advance rankings for 1 point tracks that are similar to good tracks. Ranking of
   ;short track is set equal to longer if
   ;     - Obs came from the same or similar sensors
   ;     - The longer track has at least 3 points
   ;     - The origonal tags from the sensor match or original tag was unknown
   ;       (SENSOR_ID is the same or equal to 9XXXX)
   ;     - The w errors are approximately the same
   ;When selecting the better track, the one closest in time (age is about the same)
   ;to the shorter track is selected. This rule has a weakness in that the "not"
   ;construct requires sensor 3 (?S3) to be equal to sensor 1 (?S) rather than just
   ;similar. Problem arises from the not which does not allow conditionals as
   ;arguements. Solution is to use forward chaining to assert relevent facts about
   ;similar sensors and tracks, operate on those facts, then retract the facts
   ;when complete. For now, this implementation is incomplete but adequate
   ?FLAGS <- (flags (halo T))
   ?F <- (track (points ?P&:(eq ?P 0))(satellite ?SAT)(sensor ?S)(rank ?R)
              (w ?W) (id_sensor ?ID) (julian ?J) )
   (track (satellite ?SAT2&:(eq ?SAT2 ?SAT)) (sensor ?S2) (points ?P2&:(> ?P2 20))
         (rank ?R2&:(> ?R2 ?R)) (w ?W2&:(approximately_equal ?W ?W2 .20))
         (id_sensor ?ID2) (julian ?J2) )
   (similar ?S ?S2)
   (test ( or (eq ?ID ?ID2) (unknown ?ID) (unknown ?ID2) ))
   (not (track (satellite ?SAT) (sensor ?S3&:(eq ?S3 ?S)) (rank ?R3&:(> ?R3 ?R))
                  (julian ?J3&:(< (abs (- ?J ?J3)) (abs (- ?J ?J2)) )) ))
   =>
   (modify ?F (rank ?R2)(halo T))
);halo-single_point_track

(defrule halo-similar_tracks_different_sensors
   (declare (salience 700))
   ;Advance rankings for tracks that are similar but from different sensors. Rankings
   ;advanced if
   ;     - Tracks belong to the same satellite
   ;     - One of the tracks has a ranking of at least 60%
   ;     - The worst track considered has a rank of at least 45%
   ;     - The shortest track considered has at least 3 observations
   ;The amount that the ranking improves is based on the total number of tracks involved and
   ;varies from 2% to 5%
   ?FLAGS <- (flags (halo T))
   ?F <- (track (points ?P&:(> ?P 20)) (satellite ?SAT) (rank ?R&:(> ?R 44)) )
   (track (satellite ?SAT2&:(eq ?SAT2 ?SAT)) (points ?P2&:(> ?P2 59))
         (rank ?R2&:(> ?R2 44)) )
   =>
   (assert (similar_tracks ?F))
);halo-similar_tracks_different_sensors

(defrule front_half
   (declare (salience 600))
   ;Advance rankings for tracks from reliable sensors that also have a good ID
   ?FLAGS <- (flags (front_half T))
   ?F <- (track (id ?ID&:(eq ?ID 100))(fh ?FH&:(eq ?FH F))(rank ?R)(sensor ?S))
   (sensor (id_number ?S_GOOD&:(eq ?S_GOOD ?S))(reliability ?RELIABLE&:(eq ?RELIABLE GOOD)))
   =>
   (modify ?F (rank 100)(fh T))
);front_half
```

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   Monterey, California 93943-5002

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   Department of Computer Science
   Naval Postgraduate School
   Monterey, California 93943-5002

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   Naval Postgraduate School
   Monterey, California 93943-5002

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   Naval Postgraduate School
   Monterey, California 93943-5002

7. CDR W. Duym, Curriculum Officer — 1
   Department of Aeronautics and Astronautics
   Naval Postgraduate School
   Monterey, California 93943-5002

8. LCDR D. Brutzman, Code OR/BR — 1
   Department of Operations Research
   Naval Postgraduate School
   Monterey, California 93943-5002

9. Edna Jenkins, Code 332 — 1

Naval Space Surveillance Command
Dalghren, Virginia 22448

10. Dr S. Knowles 1
Naval Space Surveillance Command
Dalghren, Virginia 22448

11. LCDR Michael Hecker 1
SPAWAR-40
Naval Research Laboratory
4555 Overlook Ave SW
Washington, D.C. 20375